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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLVIII., No. 2944.] TUESDAY, OCTOBER 14, 1919. [71ST YEAR.

EDITORIAL NOTES.

An Early Gas Bill Promised.

THE expected announcement has come from Mr. Garnham Roper, *viâ* the National Gas Council, that the Board of Trade intend to introduce into Parliament, with as little delay as possible, a Bill based upon the Fuel Research Board's recommendations as to gas standards; and in connection with the proposal regarding the alteration in the basis of charging for gas as advised in the report, the Board propose to include in the Bill provisions for a revision of existing standard and maximum prices. Although the letter containing this intimation does not give any definite information as to what the Board will actually propose in the Bill, the gas industry will be glad to have the definite assurance that the Board are moving, and the promise that a Bill will be promoted with as little delay as possible. This being so, there will be no occasion for any gas undertakings to prepare Bills of their own to deal with the matters composing the recommendations in the report of the Board of Fuel Research, or such of them as are acceptable, nor for the revision of statutory financial conditions. The Bill which will be promoted by the Board of Trade will be a public one; and it is inconceivable that Parliament would allow a Private Bill to proceed on a course of its own in relation to matters that are to be the subject of general legislation in a Government measure.

Until the Bill has been presented to Parliament, there will, of course, be no opportunity of discussing its contents. It is hoped that the proposals of the Fuel Research Board as to the individual determination by gas undertakings of the thermal quality gas they shall trade on will be adopted; but the wording of the second paragraph of Mr. Garnham Roper's letter leaves us in a little doubt as to whether or not the Board intend to adopt the B.Th.U. basis of charging for gas. We rather think that they do contemplate submitting the suggestion to Parliament; seeing that it is "in connection with the alteration in the basis of "charging for gas" that they "propose to include pro- "visions for a revision of the existing standard and maxi- "mum prices of gas." It cannot be seen how, regarded from the point of view of policy, the liberty in the production from coal of B.Th.U. in gaseous form can well be dissociated from charging on the thermal basis; and, moreover, this basis of charge will fully justify Parliament in granting a liberty which will ensure gas managements working with an eye upon the fullest overall economy—from coal throughout the system of manufacture and distribution—and so doing the best possible for all concerned. The Board of Trade have recognized, in prescribing in the present coal situation a "maximum" of 425 B.Th.U. gross for gas, the potentiality of gas undertakings to economize in coal by producing a larger number of B.Th.U. per ton handled; and what has been learned in this respect by the Board, it is hoped, in combination with the report of the Board of Fuel Research, will guide Parliament to provide an open way for the industry to develop to the full efficiency, economy, and more extended service. The gas industry is looking to a modification of certain of the subsidiary recommendations of the Board of Fuel Research. It is hoped there will not be disappointment in the matter of the relaxation of the percentage of inerts originally proposed in the report, and that nothing more will be heard of the suggestion as to sulphur compounds other than sulphuretted hydrogen. This latter is a question that was years ago settled by Parliament; and nothing has happened to warrant it being reopened. Gas managers know perfectly well that any undue impurity of their gas would be fatal to the prosperity of their undertakings; and therefore they may be relied upon to guard against anything of an imperilling nature.

Mr. Garnham Roper's letter also contains a promise that at an early date the Board will be introducing a Bill to deal with certain difficulties which have arisen in consequence of statutory limitations in respect of capital required by gas and other public utility undertakings to enable them to carry out their obligations to the public. The communication indicates that the Board have well in hand the question of the needs of the gas industry. The Board have been relieved of the Railway Department; and electricity supply will be coming under the Electricity Commissioners. The now-styled Public Utilities and Harbours Department of the Board will therefore have the gas industry as one of its chief concerns. The relations of the gas industry with the Board have always been good, although we have not consistently obtained through and from it all to which it is believed the industry was justly entitled. But it seems probable that the relations of the industry with the Board will, in the changed circumstances, become still closer.

The Lessons of a Needless Strike.

THE national railway strike has done something to clear the industrial atmosphere; it has sent confidence streaming through the country; and it has set the extremist labour leaders to review their own position. And the time was overdue for this exercise on their part. Many people who deeply and seriously examine contemporary movements are persuaded that, as things in the labour world were trending, those who attempted to make the Government bend to force through the sudden stoppage of the railway systems of the country really did a national service at a most opportune time; for it wanted something of the kind to bring labour thought and methods from their aerial heights down to practical level. The strike has disillusioned and has sadly disappointed the extreme party in the labour world. It had become a tradition with them, we read, that the country could not endure a three days' railway strike; and it was upon this tradition that the leaders were confidently reposing, until to their surprise they saw something they had not previously detected—a country with the power in it to meet a great internal emergency, and ready and willing to face a struggle longer than the unions could have gone on without an absolute disintegration and collapse of their forces, the members of which would in their own interests have been compelled to transfer their allegiance to the other side, or starve. As Mr. Lloyd George said the other day, the strike has proved that this is a really democratic country, and that public opinion rules. With public opinion behind it, the Government were very strong; without it, the railway strike would have quickly ended in the manner that those desired who infamously engineered it.

Another thing that the extreme labour unionists had not realized was that their ambitions and contemplated strategy in attaining them were entirely out of keeping with the country's developments; and when they reconsider their position in the light of the lessons of the strike, there may be a little less keenness for nationalization on the part of those who have adopted it as a panacea for all the ills from which (even under the new conditions) they profess to believe that labour is still suffering, though we do not think the majority of intelligent workers of the country have any sympathy to-day with the professions made on their behalf.

However that may be, labour extremists have now learnt that the Government are the leaders of the nation; and that, when the nation are convinced that it is being led aright, then the whole of the national resources are at the command of the Government, including an army of voluntary workers. As we remarked last week, the Union leaders who insisted upon the strike had failed to examine their own position in the light of changed conditions. The internal combustion engine has provided a new national power in road transport; and no trade union can to-day claim a monopoly of the skill required in its operation. Every day every man is rubbing shoulders with others who are not trade unionists who can drive a motor-propelled vehicle; and the numbers are increasing who can, with little additional tuition, drive steam and electric trains. Food transport is thus assured; and the surplus for other purposes will be of a constantly enlarging quantity. All this means a powerful new condition to be met by those favourable to extreme action on the part of trade unions. Success by them, unless in the national opinion their claims are justified, will have to be dearly bought, with a country able to withstand for longer periods attacks upon it from within. Federation of unions with the idea of bringing consolidated pressure upon the nation from several quarters will only mean national unemployment, and a claim upon the funds of the unions which they could not possibly meet for any considerable period. All plans to create a big labour bully to force, not the Government, but the nation to comply with behests however extravagant or fantastical, are very crude and futile. And many prominent labour leaders agree. The Transport Workers' Union (members of the Triple Alliance) grasped this directly they found the nation solidly at the back of the Government in the recent strike, and saw failure generated for Thomas, Cramp, & Co.

We will not now consider whether the Transport Workers' and other unions would have taken a course of action other than mediation if they had not seen defeat ahead for the National Union of Railwaymen. More important is the fact that the adoption of the *rôle* of mediators, and setting-up the Committee of Fourteen, was a wise action; and the discussion that is now proceeding as to the possibility of establishing some emergency machinery whereby immediate intervention may take place in the case of future industrial disputes with the view to preventing strikes, will have the very best wishes of the whole community. For such a movement to come from labour itself is a truly healthy sign. The Parliamentary Committee of the Trades Union Congress have appointed a Special Committee to investigate fully the question of labour intervention in industrial disputes; and it is possible a trade union conference may be called together to take into consideration the question of the adjustment of war bonuses, as also the standardization of wages.

Now that there is calm deliberation over the strike and its issues, we hope that the extremists among the trade union leaders will see that it is better to go about the business of the unions in a legitimate and constitutional way, and not to attempt to impose upon the country hardships which only make the position worse for all people, and the poorest in particular. A strike has effects which extend very far beyond the boundaries of a union's membership. Industries are so interconnected, and rely so much one upon the other, that what affects one affects all, in greater or less degree. Hence the responsibility for good statesmanship within the unions, and not the prosecution of mad methods. If the trade unions would only turn their attention to the ways and means of increasing production, they would find therein the best possible grounds for obtaining and for maintaining good labour conditions. It is only by co-operation that the best can be made from industry; and anything that stops the progress of industry is to the disadvantage of the workers. We cannot, however, expect that unions will be properly led if they have men at their head who childishly say that, because the Government had at hand when the railwaymen ceased work a good supply of voluntary labour, and a transport scheme ready for dealing with the food position should an internal emergency arise (as it did arise in the railway strike), they were premeditating an attack on trade unionism. What the Government did was simply a matter of prevision. There was no attack on the unions by the Government; but there was an attack on the nation by the National Union of Railwaymen. Seeing the militant attitude that has been displayed by trades unions, together with the systematic extortion by threats and coercive measures, for a long time past now, the Government would have been answerable to the country for grave neglect if they had not made the provision that they did for meeting such an emergency. However, that by the way. What is wanted now is the settling-down of labour to the serious work of raising the production of the country; but there are labour union leaders who have no intention of enabling this to be done. They have on the table other matters of policy and principle which they think of far more importance, although to-day wages are generally high, and hours of labour not beyond the physical endurance of any sound man.

Nationalization.

The Parliamentary Committee of the Trade Union Congress, with the Executive of the Miners' Federation, have (acting on the instructions of the recent Glasgow Congress) had an interview with the Premier on the subject of the nationalization of the coal-mining industry; and one result is that the issue between the miners and the Government is now clearly defined. The miners want the nationalization of the whole industry; and they desire a large share in the executive control, which reasonably translated means the management of national property by the Miners' Federation. The deputation learned from Mr. Lloyd George what they expected to learn—that the Government have come to the definite conclusion that they cannot see their way to advise Parliament to pass a measure for taking over as a business of the State the management of the mines of the country. But they are fully prepared to abide by their previous pledge, to buy out the mineral royalties of the United Kingdom, and to nationalize the coal deposits; to make a deduction out of the compensation paid to raise funds for improving the miners' condition of life; and to take power to give the miners some effective voice in the control of the industry by means of Pit Committees, and, if a unification scheme is adopted, by means of representation on the District Boards of Directors. In these ways, the miners, while not having any power in management, would be able to maintain an effective control of the conditions under which they work. These proposals have already been rejected by the Executive of the Miners' Federation; and, if they continue this attitude, as is their indicated intention, then (as the Premier says) they are throwing away an opportunity such as has never before been offered to labour without any obligations on their part.

The Miners' Executive contend that it is the bounden duty of the Government to carry out the Sankey nationalization report, to which they with Messrs. Webb and Money were the only subscribers, and which they persist in referring to as the Coal Commission's report. There is no duty upon the Government to do anything of the kind. They have to consider not only the recommendations, but the substance upon which the proposals are founded. The substance beneath is found to be well mixed with theory and personal opinion, of a strength upon which men of large business experience cannot place any material value. If any reason were needed for the attitude of the Government, it is supplied by the fact that the hollowness of one of the main theories in the Sankey report has been exposed by the recent strike in the Yorkshire coalfield and the more momentous railway strike. The Miners' Federation have nothing for which to thank those within their ranks and their railway allies for so inopportunely (but luckily for the nation) showing the futility of Mr. Justice Sankey's submissions as to perfect peace following a change of employer. If a man is paid justly for doing something, it is a moral duty on his part to render just service (providing that the work is of a legitimate order) in return—no matter who is his employer. But the ethical ground is something upon which men of the type and opinions of Mr. Smillie do not care to tread; any more than they care to commit themselves to hard-and-fast promises as to results if nationalization is accorded. Their predictions as to the material issues of nationalization are as vague and airy as those of the most pronounced visionary ever known. The nation will require something more than such feeble talk before they accept and ratify any step such as the Miners' Federation or the Trade Union Congress consider they—and not the nation—have the right to "compel" the Government to take, which is in reality a threat to commit an outrage upon constitutional procedure. There can be no compelling of the Government if the nation is against becoming the owners of the coal mines; and whether they want to become owners is a

question the nation must themselves be allowed to decide, if there is any indication that they are not satisfied with the decision of the Government.

What the next step will be in this matter is not known. There is some talk of a very considerable desire to proceed in quite a constitutional manner, and first by educational process. The Miners' Federation have already well in hand a programme for an educational campaign by means of public meetings. If the Miners' Federation can educate the nation to a belief in the virtues and benefits to the country of the nationalization of the mines, then all would be plain sailing. One labour leader says he is sure that the Government have failed to realize how earnest are the rank-and-file of the Miners' Federation on this question. We think the miners have failed to realize how earnest are a preponderating number of the people of the country against nationalization, and that they consider they have rights as well as the miners. There is also talk of "pres-" sure" being brought to bear, and of the "withdrawal of "labour." Any threat of striking, and the miners will at once set the nation resolutely against them. It is hoped that there will be no breaking-away from constitutional procedure, and from seeking a democratic decision. The next step will be, under the Glasgow resolution, to hold a Special Trade Union Congress to consider the steps that shall be taken to "compel" the Government to accede to the aspirations of the Miners' Federation. Meanwhile, the Executive of that body and representatives of the district branches will have conferences to consider the position.

"Maximum" Calorific Value—425 B.Th.U.

The coal situation continues clouded by uncertainty; and the seriousness of it is accentuated by the communication addressed by the Coal Controller to the managers of gas undertakings, and by the revised Gas and Coal Emergency Order issued by the Board of Trade. These documents override the two previously issued, and are respectively dated Oct. 6 and 7. Therefore the ending of the railway strike, while it has done something to brighten the general outlook, has not lifted the anxiety that obtains in the responsible Government Departments over the position of coal stocks, the replenishing of stores, and the satisfaction of the whole community in respect of its fuel requirements during the winter, of the approach of which atmospheric temperatures have already given us some sharp warnings. The coal position was bad enough before the railway strike; it is infinitely worse now, with nine days' complete stoppage of coal distribution by the hard-pressed railways, and several days more on which disorganization has impeded distribution. The very wording of the communication from the Coal Controller is symptomatic of a grave peril in respect of coal. "Serious depletion of stocks of coal," and "the "danger of a severe general shortage of coal during the "winter," are phrases that would not be lightly employed if there was not the occasion. And, if necessity did not command, all precedent would not be thrown to the winds, and gas managers adjured "to exercise every possible economy "in the consumption of coal by stretching the make of gas "per ton to the uttermost."

In this regard, the Coal Controller's communication, read together with the Order of the Board of Trade, places in the hands of gas managers a large discretionary power, which is a very sensible proceeding. Asked by the Coal Controller to stretch the gas to the uttermost, the Board of Trade Order provides that the "maximum" calorific value shall be no higher than 425 B.Th.U. gross. As we have previously pointed out, for gas undertakings without water-gas plant or steaming arrangements to get down to this figure will be impracticable without sending out to the consumers a lot of incombustible gases. But other gas undertakings will have no difficulty whatever in complying with the maximum of 425 B.Th.U., and even, where water-gas plants or vertical retorts are available, getting well below it. In short, construed as it should be, the Order is to get into the gas-mains the maximum quantity of B.Th.U. per ton of coal carbonized. To have a maximum calorific value imposed—and such a reasonable figure—is an altogether new experience in an industry that has been legislatively much over-controlled and miscontrolled. The Board of Trade and the Coal Controller may rely upon it "that no precau-"tion will be omitted which is necessary to secure the main-"tenance of a continuous service during the winter." The liberty to take such precautions has never before been conferred; and gas managers, in the interests of the country, of the consumers, and of their undertakings, will do their best to help to meet the situation, and keep the gas supply going; while giving every possible help to the consumers to adjust their gas-consuming appliances to the new conditions. What is said in the Coal Controller's communication as to pressure will be noted, as will also be the emphatic exhortation to gas undertakings to receive all coal possible, whether procurable by rail or sea. The Coal Controller and the Board may rest assured that the experienced gas manager is not likely to reject any opportunity that presents itself for procuring stocks. The troubles of the year have had their lessons, and have materially heightened appreciation of coal stocks that would at one time have been regarded as unduly extravagant and largely useless.

Determining Calorific Power under the Beilby Report.

The question of determining the calorific power that a gas undertaking shall supply, if the Beilby report (modified in certain details) governs the future operations of the industry, is a matter that has to receive the careful consideration of every responsible engineer; and the determination will have to be done in no perfunctory manner. It will have to be carefully and systematically worked-out, taking present conditions and prospective possibilities into account. "Engi-"neer" has now contributed his second article, under the heading of "The Meaning of the Beilby Report;" and those who peruse and carefully study it will see how impossible it is for even an expert to pronounce, without very careful investigation of all the circumstances, any precise judgment as to the calorific power that any one undertaking should elect to supply. Various considerations are set forth that affect the choice of a calorific power standard; but it will probably be agreed by many engineers who have been manufacturing lower calorific power gas, and so can compare financial effects in the gross and in detail with the making of higher-grade gas, that the considerations could well be extended. In the calculations that "Engineer" has made as to the cost of producing various grade gases per unit of 100,000 B.Th.U., the bases must be recognized as being more or less of an arbitrary character, and so must be taken as more directional than actual for those who are looking into this matter on their own account, though due credit must be given to our contributor for the thorough manner in which he has, within the boundaries of his study, marshalled and presented the details, and devoted himself to working-out the results. All the figures, however, will be subject to variations supplied by local conditions; and it must be remembered that the results are presented per unit of 100,000 B.Th.U.

Taking the cost of manufacture per 100,000 B.Th.U., it will be seen that an undertaking steaming in vertical retorts, and making 24,000 c.ft. of 400 B.Th.U. gas, can produce on the terms adopted and put into the holder 100,000 B.Th.U. for 4·78d. net, as compared with 5·78d. for a coal gas of 550 B.Th.U., and a make of 12,000 c.ft. of gas. Regarding the mixtures of coal and water gas, these are (on the terms adopted) quite out of the running; but there will be engineers who will no doubt be prepared to dispute the applicability of the figures or the difference shown to their own working. However, it is seen that the difference into the holder per unit of 100,000 B.Th.U. between the 550 B.Th.U. coal gas and the 400 B.Th.U. vertical retort gas, with steaming, is 1d. in favour of the latter. Now turn to the distribution costs. Under the conditions laid down, the distribution expenses per unit of 100,000 B.Th.U. are less with the 550 B.Th.U. gas than with the 400 B.Th.U. gas. The figures are respectively 2·97d. and 3·25d.—a difference of 0·28d. in favour of the plain coal gas. There does not seem to be much in these differences regarded per unit of 100,000 B.Th.U. But there is. Between the B.Th.U. make of one system and the other, there is a difference of 3 million B.Th.U. for sale per ton of coal handled, in favour of vertical retorts and steaming. There are by the coal-gas system (disregarding unaccounted-for gas) 6,600,000 B.Th.U. for sale, and by the vertical retort system 9,600,000 B.Th.U. Only (per ton of coal) 66 gas units for sale at 10d. is not so good as 96 units at 10d., or less. Our contributor has not, in our opinion, paid sufficient attention to the bearing of the commercial side in contributing to the choice of a calorific standard. If we take the saving on manufacture of 1d. per 100,000 B.Th.U., this represents, in favour of the

vertical retort and steaming, 8s. per ton of coal—that is, 96 gas units at 1d. If we deduct from this the calculated higher cost of distributing the lower-grade gas, 0·28d. per unit, we still have a saving of 0·72d. per unit; and this is equivalent to 5s. 9·12d. per ton of coal, or £288 saved per 1000 tons of coal. Besides which there are thirty more gas units for sale per ton of coal under the conditions adopted in the article.

In connection with distribution, there are other factors than those enumerated by our contributor which should be brought into account—such as the influence of using higher pressures in distributing lower grade gas, which will have a bearing upon capital expenditure and main capacity. The local characteristics of demand will also very materially influence costs—such as the evenness through the day of the demand curve, and the magnitude and diversity of business. There is considerable complication in all this, which defies any general treatment or deduction in relation to the selection of calorific standards. Every case must have separate treatment. Still there is guidance in such a study as we have before us, which will be valuable to many in considering the matter; and not the least illuminating part of the article will be the considerations affecting the quality of the water gas manufactured in respect of economy.

National Kitchens and Electricity.

In the "JOURNAL" for Sept. 3, 1918 [p. 437], comment was made upon the "Official Handbook of National Kitchens and Restaurants;" and there was criticism of the comparison that was made as to the relative merits of gas and electricity for cooking purposes. Experience has produced a change. We have just received another copy of the "Handbook;" and between pp. 14 and 15 there has been inserted the following announcement: "The National Kitchens Division has had extended experience of cooking appliances, and still advises the use of steam, when available, for heavy duty, such as boiling-pans. Owing to serious alterations in prices, &c., the comparison between gas and electricity should be ignored. The division's experiences of electricity for cooking have been anything but favourable. Gas appliances are more constantly reliable, and much cheaper to instal and maintain; and they consume less fuel." We are not surprised at this change of view. It is what we anticipated would issue from experience; and the anticipation was not without a good practical foundation. But it is a nasty pill for the electricians to swallow. There will be much chagrin over the failure to support their recommendations—so lavishly made, and so eloquently sustained by words in the preliminary stages—by experience under the critical test of daily working conditions.

Gas "Profiteers" Beware.

A fortnight ago it was announced that the Anti-Profiteering Department of the Board of Trade had included gas-meters and gas-stoves in a new schedule of articles; and on Thursday the "Daily News" almost gave us a shock by stating that gas was going to be added. If this be true, then the Anti-Profiteering Department must have some humorists engaged in it, or persons who have no knowledge of the financial state to which the industry has been reduced by the war and legislation that is altogether out of harmony with the new conditions. However, there are members of the public who, through ignorance of the actual circumstances, are persuaded that gas undertakings are profiteering. If any of them have the courage of their convictions, assuming the prediction as to gas coming within the next schedule is correct, they may be enlightened by submitting cases to their local tribunals. There would be a big surprise in store for them, which might result in sympathy for the gas suppliers as well as for themselves.

The Real Demand of Labour.

Every time there is trouble in the labour world, there is renewed discussion as to how it can be best averted. When the trouble has subsided, then oblivion, and little further care. For years many men in the gas industry—led in this particular matter by the South Metropolitan Gas Company—have advocated the application of the principles of co-partnership as the best known scheme for synthetizing the interests of employers and employed. The extremists in the labour world who prefer violence to commensense plan do all they can to decry and cast ridicule upon the antidote to their own well-distributed poison. But they are not the only men in the labour world; and their brand of intelligence is not the only one in existence there. There are other leaders who think deeper, and who have the real welfare of the employed at heart, and want to improve their conditions in the best possible way. These men seek for positive construction, and not destruction. Mr. Harry Gosling, who was one of the fourteen mediators in the recent railway strike, has said in very emphatic language that the real substance of the demand of labour is that they shall be raised from the status of employees to the status of partners. Lord Robert Cecil says he believes this is true, and really touches the spot! It is not a question of wages or conditions, but a demand that the status of labour shall be changed in the industrial organization. But who is listening to this? If it is the real demand, then why refuse to take steps to give it fulfilment? There is no answer. There are opposing currents which, when they meet, simply spread out, and are lost in the common bulk of affairs.

Motor Spirit in National Emergencies.

The railway strike contained many lessons for all people. One of them was, directly the strike came, the importance of good stocks (well-distributed) of motor fuel, and the greater the productive capacity of home-produced motor spirit, the better. Every facility and encouragement should therefore be given to gas undertakings to extract benzol from gas; and for undertakings above a certain size, perhaps a contribution to the production should be made obligatory. The use of benzol for motor car work has come to stay. Benzol is produced here; petrol is imported. The recent railway crisis is not the last labour crisis we are likely to experience in which rail transport will be held-up. Preparation for an emergency of the kind has been proved to be a fine thing; and motor fuel is an essential in the preparation.

BOARD OF TRADE PROMISES AN EARLY BILL.

Legislation to Deal with the Report of the Board of Fuel Research and Standard and Maximum Prices.

THE National Gas Council have received the following letter from Mr. Garnham Roper, of the Public Utilities and Harbours Department of the Board of Trade, regarding the intention of the Board to promote a Bill dealing with the subjects mentioned above, as well as one to remove difficulties that have arisen in consequence of certain statutory limitations affecting the raising of capital.

7, Whitehall Gardens, S.W. 1., Oct. 8, 1919.

Sir,—I am directed by the Board of Trade to state for the information of the National Gas Council that they have given careful consideration to the representations made by the deputation from the Council which waited upon Sir Auckland Geddes in July last, and that they propose to introduce into Parliament, with as little delay as possible, a Bill relating to Gas Undertakings in the United Kingdom, based upon the recommendations contained in the recent report of the Fuel Research Board upon Gas Standards.

In connection with the alteration in the basis of charging for gas recommended in that report, the Board propose to include in the Bill provisions for a revision of the existing standard and maximum prices of gas.

I am to add that the Board have also under consideration the introduction at an early date of a Bill to deal with certain difficulties which have arisen in consequence of statutory limitations in respect of the raising of the capital required by gas and other public utility undertakings to enable these undertakings to carry out their obligations to the public.—I am, &c.,

(Signed) GARNHAM ROPER.

Glasgow Housing and Health Exhibition.—The Housing and Health Exhibition which opened on the 8th inst. at Kelvin Hall, Glasgow, contains, as was to be expected, many interesting gas exhibits. Conspicuous among these is the complete range of gas cooking, heating, and hot-water equipment suitable for housing schemes and business requirements displayed on Stand No. 163 by the Richmond Gas Stove and Meter Company, Ltd., of Warrington and London. The practical method that has been adopted of showing apparatus connected-up in actual operation, enables architects, surveyors, builders, and all business men who are interested in housing and health to test for themselves the practicability, efficiency, and economy of modern gas equipment. The series of popular "Bungalow" cookers is shown, also the "Ironclad" hot-water circulator, and other apparatus to provide complete hot-water supply to all parts of the house. The "Period" series of silent gas-fires attract attention. The national need for economy in coal, labour, and transport, and the present interest in housing schemes, render the exhibit of particular value at this time.

TEMPORARY INCREASE OF CHARGES ACT.

Orders Recently Made.

Below is given the latest list of Orders that have been made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act, authorizing increases in maximum charges to the extent named in each case.

Bakewell Urban District Council, from 4s. within a certain radius and 5s. outside, to 6s. per 1000 c.ft. throughout the limits of supply.
Marple Urban District Council, from 4s. 6d. to 6s. 9d.
Mountain Ash Urban District Council, from 4s. 6d. to 6s.
Newcastle-under-Lyme Corporation, from 4s. 3d. to 5s.
New Mills Urban District Council, from 4s. 6d. to 6s.
Scunthorpe Urban District Council, from 4s. to 6s.

Further Applications.

Applications under the Act have been made to the Ministry of Health by the

Appleby Town Council.
Birstall Urban District Council.
Penrith Urban District Council.

MAKE OF GAS STILL TO BE STRETCHED.

Instructions by the Coal Controller and the Board of Trade.

The attention of the managers of all gas undertakings is particularly directed to the following communications (in the order of the dates on which they were issued) from the Coal Controller and the Board of Trade. It will be seen that the coal position, in the view of the central authorities, makes it imperative that the production of gas per ton of coal should continue to be as large as possible.

Stretch Gas Make to the Uttermost.

Sir,—With reference to the letter of the 1st of October, confirming telegram regarding the Gas and Coal (Emergency) Order, I am directed by the Controller of Coal Mines to inform you that, in view of the serious depletion of stocks of coal during the strike, and the danger of a severe general shortage of coal during the winter, it is most important—in spite of the termination of the strike—that you continue to exercise every possible economy in the consumption of coal by stretching the make of gas per ton of coal to the uttermost; and that, while discretion may in future be used in applying the provisions of the Order as to reduction of pressure for the purpose of conserving stocks where low, it should be clearly borne in mind that it will be some time before the flow of coal will again be normal, and that no precaution should be omitted which is necessary to secure the maintenance of a continuous service during the winter.

The importance of immediately accepting all coal which may be available, whether by rail or by sea (in the case of undertakings which can receive seaborne coal) cannot be too strongly emphasized in view of the uncertainty of supplies in the near future.—I am, &c.,

W. A. Lee.

Board of Trade (Coal Mines Department),
Hotel Windsor, Victoria Street, S.W. 1, Oct. 6, 1919.

Maximum Calorific Value, 425 B.Th.U.

The Board of Trade make the following announcement with regard to the effect of the termination of the strike on restrictions in the use of coal and coke, gas, and electricity.

The Lighting, Heating, and Power (Emergency) Order, 1919, prohibiting display lighting has been revoked.

In view of the danger of a severe shortage of coal in the winter owing to the diminution of stocks during the strike, it is necessary to maintain for a short time the restrictions imposed by the Coal and Fuel (Emergency) Order, 1919, limiting deliveries of coal to 1 cwt. The Controller of Coal Mines will, however, authorize the relaxation of the restriction in those districts in which in his opinion this may safely be done.

The Gas and Coal (Emergency) Order, 1919, which prescribes a maximum calorific value of 425 B.Th.U. gross, and provides for the diminution of pressure in case of necessity, will also remain in operation.

The embargo which Local Fuel Overseers were instructed to place on 25 p.ct. of all industrial stocks in their districts has been removed.

Board of Trade, Oct. 7, 1919.

The postponed visit of the Manchester and District Junior Gas Association to the works of Leyland Motors, Ltd., will take place to-morrow (Wednesday).

The general meeting of the North of England Gas Managers' Association, which was originally called for the 11th inst., will take place next Saturday, at York.

The meeting of the Eastern Counties Gas Managers' Association, which had to be postponed on account of the railway strike, has now been fixed for Wednesday, the 22nd inst., at Salisbury House, London, E.C. The papers to be discussed have been circulated among the members, and were published in last week's "Journal."

OBITUARY.

Mr. Joseph Braddock, who died at his residence in Oldham on Monday evening of last week, was one of the founders of the meter-making firm of Messrs. J. & J. Braddock, and had personally been well known in the industry for a great number of years. At the time of his death, he had reached the good old age of 82 years. As a boy, Mr. Braddock served his apprenticeship at the meter-works of Messrs. West and Gregson, Union Street, Oldham; and in 1861, along with the late Mr. George Newton and Mr. John Waugh, he founded the firm of Newton, Waugh, and Braddock. In 1864 the works were transferred from Barnfold to Wellington Street; and in 1869 Mr. Newton withdrew, and the business was carried on by Mr. Braddock and his uncle, Mr. Joseph Braddock, of York, who had joined the firm some years earlier. Meters Ltd., of Manchester, bought the business in 1897; and the late Mr. Joseph Braddock retired from active participation—the firm having since been carried on under the direction of his sons. Apart from his interest in the meter works, deceased was well known in cotton circles; and he was a Director of the Radcliffe and Pilkington Gas Company. As a Governor of the Oldham Royal Infirmary he showed keen interest in everything tending to the benefit of the institution. To those engaged at the meter works he was known as a generous and considerate employer. Mr. Braddock was a prominent Freemason.

Mr. Bertram H. Latter, who died last Tuesday, as the result of an accident, was Deputy-Chairman of the Bromley Gas Consumers' Company, previous to the incorporation of the undertaking with that of the South Suburban Gas Company.

The death occurred at his residence in Ayr, last Tuesday morning, of Mr. Hugh S. Walker, one of the partners in the firm of Messrs. W. G. Walker & Sons, of the Hawkhill Chemical Works, in that town.

PERSONAL.

GLASGOW CHIEF GAS ENGINEERSHIP.

The Gas Committee of the Glasgow Corporation have agreed to recommend that Mr. John W. M'Lusky be appointed General Manager and Engineer of the Gas Department, at a salary of £1500 per annum, in succession to Mr. Alexander Wilson. Mr. M'Lusky, who is at present Gas Engineer and Manager to the Blackburn Corporation, is a native of Port Glasgow, where he was trained in practical engineering and drawing office work. In 1902 he commenced gas-works practice as Assistant Engineer at Renfrew, where new gas-works were erected some two years later. His next move was in 1906, when he was appointed Assistant Engineer to the Barking Gas Company, in which portion of London new districts were at that time being rapidly developed, rendering considerable extensions necessary. Subsequently he held appointments, and gained much useful experience, in Bridgwater and Portrush; and then in 1915 he was selected for the position of Engineer and Manager of the Airdrie Corporation Gas Department. Mr. M'Lusky, however, did not long remain there; for in June, 1917, he succeeded the late Mr. A. Morton Fyffe as Gas Engineer and General Manager at Blackburn. The excellent nature of his work at Blackburn is abundantly shown by the success which has attended his application for the Glasgow appointment. But it may be said that he has very successfully carried on there under great difficulties, and that he has commanded the entire confidence of the Gas Committee and the Council. Improved methods of working have not only effected considerable saving in coal, but have also improved the quality and quantity of the residual products. Mr. M'Lusky, who is now 36 years of age, studied in the Paisley and Glasgow Technical Colleges, and obtained first-class honours in "Gas Engineering," with other certificates, and a special prize in "Building Construction and Drawing."

Following upon the recently announced resignation by Mr. R. S. Gardiner of the chairmanship of the British Gas Light Company, Ltd., we learn that Mr. Henry Woodall, M.Inst.C.E., has been unanimously elected to succeed him in the chair, as from the 1st prox. The shareholders will continue to enjoy the benefit of Mr. Gardiner's services as a Director.

Mr. A. D. Young, of the Sheffield Gas Company, has been appointed by the Burnley Corporation Gas Department as draughtsman, at a salary of £300 a year.

Mr. C. U. B. Gurnett, who has been filling the position since the retirement of Mr. R. J. Lukey, has now been appointed Secretary of the Australian Gas Light Company.

The Chesterfield Gas Board have accepted the resignation of their Consulting Engineer, Mr. J. Ferguson Bell, of Derby, and have expressed their appreciation of his services.

Sir Evan Jones, Bart., M.P., who consented to accept the position of Controller of Coal Mines for a limited period at the urgent request of the President of the Board of Trade, has found it necessary to resign the position; and his resignation took effect

last week. The announcement will be received with regret by the gas industry, with whom Sir Evan Jones has shown great sympathy during his term of office.

From several applicants, the Burnley Corporation Gas Committee have appointed as Distribution Superintendent Mr. LLOYD, of Weston-Super-Mare. He was trained in the works of Messrs. Fletcher, Russell, & Co., at Warrington, and will have charge of the Gas Department's Show Room and Sales Department, and will visit gas consumers to advise them as to the installation of appliances for industrial, domestic, and other purposes.

GAS ACTS FOR 1919.

[Second Article.]

WE continue this week our notices of changes made in the gas measures that have been passing through Parliament this year. The reviews of the Bills dealt with here were given in the "JOURNAL" for Jan. 14 and 21.

The title of the Pembroke Docks and Town Gas Company now disappears; and the PEMBROKE DISTRICT GAS COMPANY is the name by which the newly incorporated Company will henceforth be known. The proposals of the Bill were reviewed on Jan. 14. The limits of supply have been extended. The capital originally asked for was £131,450. This has been reduced to £96,450, of which £31,450 is the "original" capital, and £65,000 the additional. When the additional capital was at the contemplated £100,000, it was sought to have the right to issue preference shares to an amount not exceeding £67,720. With the reduction of the additional capital, this latter figure has been lowered to £48,225. Any preference stock created under the powers of this Act will carry a dividend not exceeding 7 p.ct. per annum, as the Directors may determine. Borrowing, debenture stock, and redeemable preference and debenture stock powers are all in ordinary form. The new lands and works clauses (with the one-third residuals restriction), and the sliding-scale terms have not been varied. The standard price is to be 5s. within a radius of 2½ miles from the Company's works; but in other parts of the limits of supply, the Company "shall," for a period of not less than five years from the passing of the Act, at all times exceed the price for the time being charged in the inner area by 6d. per 1000 c.ft., and may at any time after the period exceed the price charged in the inner area by not more than 6d. per 1000 c.ft. But after the five years, the Company may charge in any part or parts of the outer area a price lower than that in any other part of the outer area, but not less than the price charged for the time being in the inner area. The Company have been granted a variation of the terms of the prepayment meter clauses, by being allowed to charge 1s. 3d. per 1000 c.ft. in excess of the ordinary charge for the hire of prepayment meters and fittings, and 1s. 6d. if a cooker is included. When the calorific standard of 500 B.Th.U. comes into operation, the minimum pressure is to be not less than 15-10ths; but all gas sold to the Great Western Railway Company is to be supplied at 20-10ths at the inlet of the primary meter or meters registering the supply. There are a number of protective clauses; but the others are quite general in character. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

In their Act, the SHERINGHAM GAS AND WATER COMPANY have had the maximum price of gas fixed at 6s. 6d. per 1000 c.ft. as desired; but after the taking of the indices for the quarter ending at Christmas, 1921, the Board of Trade may at any time, on the application of the District Council or the Company, revise the maximum price. The calorific power standard of 500 B.Th.U. appears; and in regard to pressure, while 15-10ths is prescribed as the minimum, the Midland and Great Northern Railways Joint Committee are to be supplied at 20-10ths. The limit as to the amount of preference stock that might be issued in respect of the additional capital authorized by the Order of 1911 has been removed; and the dividend may now not exceed 7 p.ct. instead of 6 p.ct. All the other provisions stand. [*Parliamentary Agents: Messrs. Lees and Co.*]

We should have to go back to January, 1918, for the sketch we gave of the Bill promoted by the SOUTH SHIELDS GAS COMPANY, and which is now before us in the shape of an Act, and much altered. It was one of the Bills that dealt with, among other things, the Company's financial hardships; and so in this respect it has lost one of its chief features. The Act provides for the extension of the limits of supply, so as to include as much of the parish of Whitburn as is not comprised within the existing limits. But it is provided that, if the Sunderland Gas Company in the session of 1919 apply for the addition to their area of supply of the portion of the parish referred to, the South Shields Company shall not oppose such addition; and if the Sunderland Gas Company supply within three years, the present power of extension to the South Shields Company is not to have effect. The one-third residuals restriction has been put upon the Company at the end of the maintenance of works clause, thus depriving them of the liberty they desired. The Company asked for a calorific standard of 475 B.Th.U., but one of 500 B.Th.U. appears. Since the Bill was lodged, provision for testing for sulphuretted hydrogen has been inserted. "The hours during which the purity of the gas may be tested shall be between nine o'clock in the forenoon and eleven o'clock in the afternoon." Provision is made for a testing-place on the line of a principal main within one mile from the Company's works at Jarrow. The minimum pressure has also been raised to 15-10ths. The Company now possess authorization to supply power gas, and to purchase gas from other sources. There are over ten pages of protective clauses. The Company have had their borrowing powers raised to one-half of their issued capital. Here we have something new:

> If, at the expiration of a period of twelve years from the termination of the present war, the Company shall not have exercised to the full extent the powers of raising money conferred by this Act and the recited Acts, then, unless and except so far as the South Shields Corporation, the Jarrow Corporation, the Hebburn Urban District Council, and the South Shields Rural District Council, or any three of them, shall in writing otherwise agree (*a*) the sum which the Company may, after the expiration of the said period, raise under the powers conferred by this Act and the recited Acts—otherwise than (1) by reborrowing, or by raising by the creation and issue of debenture stock, any sums not exceeding the amount secured by any mortgages or bonds existing at the date of such expiration, and subsequently paid off, or (2) for the purpose of redeeming any redeemable preference stock or redeemable debenture stock outstanding at that date—shall be reduced by the sum of £77,755; or (*b*) if the amount of such unexercised powers is equal to or less than the said sum, such unexercised powers shall cease to be exercisable after the expiration of the said period.
>
> The proportions in which any such reduction of unexercised powers as aforesaid shall be effected as between moneys authorized to be raised by the creation and issue of ordinary stock or preference stock on the one hand and moneys authorized to be raised by borrowing on mortgage or bond, or by the creation and issue of debenture stock on the other hand, shall be such as the directors of the Company may determine. Provided that no such reduction as aforesaid shall be effected in such proportions that the total amount remaining to be raised by borrowing on mortgage or bond, or by the creation and issue of debenture stock, together with the amount already raised at the date of such reduction by those means or any of them, exceeds one-half part of the total amount remaining to be raised by the creation and issue of ordinary stock or preference stock, together with the amount already raised at the said date by that means.

In connection with the costs of the Act, it has been decided that these shall be spread over the three years following Dec. 31 next, in as nearly as may be each year one-third part. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The story of the establishment of the STOCKSBRIDGE GAS COMPANY to supply coke-oven gas was fully related in the notice of the Bill in the "JOURNAL" for Jan. 14. The proposed capital of £39,000 has been allowed, of which £7000 is the original capital. The original capital carries a dividend of 10 p.ct., the additional ordinary capital 7½ p.ct., and the preference capital 6½ p.ct. Borrowing, debenture, and redeemable powers are granted on the usual lines; but the Company are only to raise £8000 in any form of their additional money powers unless and until they have resolved themselves to manufacture gas, and to erect works for the purpose. Other clauses which were formerly noticed remain unaffected, with the exceptions referred to below. Certain protective clauses have been added. Regarding the powers of the Sheffield Gas Company within the limits of supply, other than in a defined joint area, these are determined. Within the joint area, the Stocksbridge Company are not to supply gas to any person, or for use on any premises, if and so long as the Sheffield Company are prepared to supply gas within a reasonable time, provided that the Sheffield Company shall give to the Company notice of their intention to supply gas within fourteen days after the receipt by them of a request for such a supply, if the point at which the supply is to to be given is within 25 yards of any main or pipe of the Stocksbridge Company, and within one month from the receipt of the request if the point at which the supply is to be given is not within 25 yards of any main of the Company; provided also that where the Company are supplying gas by means of any main laid within the joint area in accordance with this section, nothing shall restrict, or interfere with, the right of the Company without reference to the Sheffield Company to supply from such main gas to any premises situate on the line thereof. There are other subsidiary conditions attaching to this matter. The maximum price of gas so long as coke-oven gas is supplied is to be 4s. (5s. was named in the Bill); and 5s. is to be the maximum if the Company themselves manufacture gas. The price to be charged to the District Council is not at any time to be higher than the lowest rate per 1000 c.ft. charged to any private consumer for lighting purposes. The calorific power standard is to be 400 B.Th.U. for coke-oven gas; but if the Company manufacture gas for themselves, 500 B.Th.U. The pressure of gas is to be 20-10ths. The other clauses of the Bill are in the usual form. [*Parliamentary Agents: Messrs. Dyson & Co.*]

In a General Bill, the STOCKTON-ON-TEES CORPORATION are empowered by one of the clauses to purchase the secondary products of gas undertakings for the purpose of conversion. Purchasing powers, however, are limited to one-third part of the quantity which they themselves manufacture. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

In their Act, the STOURPORT GAS COMPANY obtain an extension of their limits, with a capital of £39,800, of which £19,800 is the "original" capital. The borrowing powers, the rates of dividend, works, lands, and other powers asked for when the Bill was promoted have been granted. The proposed standard price has

dropped 6d.—being now within a radius of 1½ miles of the works 4s. 6d. per 1000 c.ft., and beyond 5s. In connection with the calorific power standard of 500 B.Th.U., it was suggested in the Bill that Simmance's total-heat calorimeter should be used; but this is changed to such apparatus as may be agreed upon by the Company and the District Council, or failing agreement it is to be that prescribed by a gas engineer appointed by the President of the Institution of Civil Engineers. The minimum pressure desired was 1 inch; but it has been raised to 2 inches. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The Act of the SUNDERLAND GAS COMPANY gives them the lands and works powers they desired; but in connection with the lands authorization, it has been enacted that the Company shall not, under the powers of the Act, compulsorily acquire any property of the North-Eastern Railway Company. An obligation to widen a public footpath is also imposed in conjunction with the lands powers. The limits of supply have been considerably extended. Since the Bill was first introduced, the Company have entered into an agreement with the South Hylton Gas Company for the purchase of their works; and this is confirmed in the Act. The same applies to the Whitburn Gas Company. The capital consolidation scheme has been sanctioned. But the additional capital powers desired have shrunk from £200,000 to £120,458; and the borrowing powers from one-half to one third. Authority to raise redeemable debenture stock has been conferred. The power-gas clauses have been deleted. As to the supply of gas, the Company are authorized to charge in the added area not exceeding 1s. per 1000 c.ft. more than the price charged by them to consumers under similar circumstances within the existing limits of supply, provided that the price charged for gas supplied to consumers outside the borough, and in any parish (except the parishes of Fulwell, Ryhope, Tunstall, and Silksworth), added by the Act to the limits of supply, shall for a period of seven years from the passing of the Act, be at all times more by at least 6d. per 1000 c.ft. than the price for the time being charged by the Company for gas supplied by meter under like circumstances to consumers within the borough. There is a big batch of protective clauses in the Act; and towards the end there is a long purchase clause in favour of the Corporation, subject to the promotion of a Bill next session. If a Bill is promoted, it will provide for the purchase price being determined by agreement or by a single arbitrator. In addition to the purchase price, provision is to be made of a sum equivalent to five years' purchase of the fees of the Directors by way of compensation to them for loss of office. Provision is also to be made for the compensation of any officers or servants other than Directors who have been in the regular employment of the Company for not less than five years, and who shall not be retained by the Corporation in the same or some similar office or employment. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The Bill of the SWINTON AND MEXBOROUGH GAS BOARD has not yet completed its parliamentary journey. The measure was noticed in our issue for April 22; and any changes that may have been made in it will be noted when a copy of the Act becomes available.

Corrosion of Coke-Oven Bricks.

In a note to the "Iron and Coal Trades Review," Mr. C. S. Graham gives a short account of the causes of the far too rapid destruction which in some districts the linings of coke-oven walls undergo. He says that the principal factors which bring about corrosion of the bricks are thermal or temporary contraction and expansion due to fluctuating temperature; under-fired bricks; wear and tear due to charging and discharging ovens; irregular heating of ovens; interaction between compounds in charged coal and oven walls. The action of sodium salts on coke-oven bricks is very pronounced; but the nature of this action depends greatly on the temperature factor. Some coking coals contains common salt, which in the washery, owing to its intimate admixture with the coal, and to other factors, is reduced in amount, but not wholly removed. The coal as charged generally contains about 10 to 12 p.ct. of washing water, which, besides the chloride, very often also contains the sulphate of sodium. In the ovens, the chloride of sodium is first volatilized, and then decomposed. The products in the presence of aqueous vapour are acid, and probably hydroxide; and a portion of the hydrochloric acid converts the oxides of iron and aluminium in the exposed part of the bricks into volatile chlorides. The remaining portion eventually unites with the ammonia. The hydroxide vigorously attacks the acid mineral constituents of the bricks, forming complex silicates. The sulphate of soda is not volatilized with the chloride, but is probably first reduced to sulphite and decomposed by the hot carbon, with the probable formation of sodium carbonate, which will act on the brick in a similar manner to the hydroxide. The composition of coal ash somewhat modifies the effect of sodium salts. If the coking mixture be so selected that the ash is of an acid nature—if there be free or uncombined silica present—the bases of the alkalies will unite with the silica, and become fixed, thereby minimizing their deleterious effect on the brickwork. Deposition of finely-divided carbon in the pores of the bricks also accounts in some degree for disintegration. Used bricks often show a maximum iron content at the end exposed to the combustion flue. In an insufficiency of oxygen, ferrous oxide (or in some cases metallic iron) is formed, which, owing to its greater fluxing power, is an important factor in facilitating the destruction of the bricks.

ELECTRICITY SUPPLY MEMORANDA.

THE heating season is upon us; and we are afraid it will be a very bad one for most householders. The coal situation is not a pleasant one. The price is terrible for many people; and supplies are not what they should be. The railway strike has succeeded in a further substantial weakening of the coal position. So everything points to householders seeking out where they can get the most economical system of heating—the system which, while saving labour, will enable them to cut out all stand-by consumption of fuel, and only commit them to payment for the fuel usefully employed. They will not obtain this economy from electricity, even if they found a heater that would give them 100 p.ct. efficiency on the electric energy utilized. The price of electricity is at a figure which for heating the ordinary pocket cannot stand. How many people can afford to pay 2d. or 2½d. per KW.-hour, or for 3420 B.Th.U.? A 2 KW. fire would cost 4d. or 5d. per hour, or respectively 4s. 8d. or 5s. 10d. per fourteen-hours' use per day. A 3 KW. heater would cost 6d. to 7½d. per hour, or 7s. or 8s. 9d. per fourteen-hours' use per day. With gas at 4s. 8d. per 1000 c.ft., an expenditure of 2d. per hour, and crediting a gas-fire with a 75 p.ct. efficiency, would give the householder as much useful heat as a 4 KW. electric-heater; and 1d. per hour as much useful heat as a 2 KW. heater. Therefore there can be no question as to which of the two labour-saving systems of heating will be selected by the householder who is in search of the utmost economy. People are beginning to predict a very cold winter, following upon the very hot summer; and the atmospheric temperature at the end of last month and the beginning of this has rather inclined us to think that these speculators in future conditions are not likely to be very wide of the mark. Gas undertakings, even at the high price of gas, are being pressed from all sides to fix gas-fires.

The Heating Season.

Not much is seen now of the old lamp radiator, except in stocks of goods that have not been exhausted, and (strange to say) in a few showroom windows of electricity undertakings, which persistence of residence shows the sluggish demand for such apparatus. The electric-fire makers are improving the construction of their productions; and they are learning too that high price will not advantage them, with electric heating costing what it does. All modern electric fires are now constructed with sectional elements. These, as a rule, have a fireclay base; and the wires are carried in grooves. Now there is a departure in the "Britannia" fire, made in 1 to 3 KW. sizes. The base of the elements is of metal, which forms a reflector. Across the front of this the wires are carried on small porcelain projections, fixed equi-distant. The elements are curved, so as to get a wide angle of radiation, as with the Richmond "R.H.D." gas-fire. Spare elements are purchasable, so that anyone can renew them. There cannot be much metal in these fires, as the 1 KW. size only weighs 4½ lbs.; and the larger sizes, 8½ and 13 lbs. respectively. The framework is of pressed steel, finished in egg-shell black and copper relief. We give these details in order to show the prices at which they are being sold, including all the necessary fittings. The 1 KW. size is priced at 25s.; the 2 KW. size, at 50s.; and the 3 KW. size, at 70s. Though electric heating is mightily dear, the manufacturers are doing their part to make the fires themselves attractive. They cannot do more.

Modern Electric Fires.

A considerable number of electricity undertakings run by local authorities are not now paying their way, despite the substantial charge increases to the consumers. It is just as wrong now as it ever was—indeed, it is indefensible—for any authority, having regard to sound finance, to subsidize electrical trading from the rates. No system of compelling ratepayers who do not require the service to help to pay the costs of those who have a preference for it can be justified. There have been various clauses proposed in Parliament to prevent this unfair system of municipal trading. There were the Bermondsey and the Winchester clauses, the imposition of which municipal electricity traders sternly resisted; but they could not advance any solid grounds for not being compelled to conduct their trading on sound commercial lines. A good example of a clause against which there cannot be any strong objection by municipal authorities who want to do business in a just manner is found in the Bedwellty Urban District Council Act of this year. As is fair, it gives the Council five years in which to develop and settle down to normal electricity business. And then at the expiration of that period, and every three subsequent years, the Council are to reconsider, and if necessary revise, the scale of prices, so that, as far as is reasonably practicable, no rate shall be required for the purpose of defraying any of the expenses of the undertaking during the three succeeding years. The prices charged are not to exceed the maximum specified in Order or Act, although, of course, there is always the Board of Trade [or the Electricity Commissioners] to whom to go for a revision of the maximum. There is also a provision which allows the scale of prices to be reconsidered and revised at closer intervals than three years. So that no excuse can be made for not keeping in the straight path to ensure the adequacy of income to outgoings.

To Be Financially Virtuous.

Contract Prices and Revision.

Important is the question of contracts in view of the obligation to fix ordinary prices that will be sufficiently productive to meet outgoings; but there is due provision in the clause to meet all circumstances. The Council are permitted to make contracts for any period even though they overlap the date of revision. Contracts are allowed to be entered into on special terms under special circumstances not applicable to ordinary consumers; but the contract is to provide that the price charged shall be subject to readjustment at the next triennial revision, or vary in the same proportion as the prices charged to ordinary consumers. This is fair. It is better than even a coal clause, which does not cover all costs; and industry has had very severe lessons of late of coal clauses falling far short in providing cover for all the expenditure increases to which production has been subjected. The ordinary electricity consumer is thus protected in the Bedwellty Act against contracts being entered into which will cause his own charges to be advanced in support of the manufacturer; and the ratepayer is also assured that the public lighting shall not be made the source of extracting money from his pockets which could be used to subsidize the concern. For any public purpose, the price for current is not to be at a higher price than that charged to consumers using energy for similar purposes, and for the like hours of supply. The clause applies the principle of "every tub standing on its own bottom," which is a very good one; and in these times when a new order of costs has come into play in electrical trading, the ratepayer needs a greater amount of protection than ever. The clause to which we have referred was reproduced early in the article, headed "Gas Acts for 1919," published last week.

War Experiences.

For electricians a pleasing account of what electricity did during the war is given in the Factories and Workshops Report for 1918 by Mr. G. S. Ram, the Electrical Inspector of Factories. But the men of the electricity supply industry know that much of what was then done was due to munitions work, and for convenience rather than for economy. Everything was abnormal; and with the armistice came a drifting-back to conditions of an altogether different order. Mr. Ram quotes a return by the Ministry of Munitions, which mentions 76 undertakings that added, in the aggregate, to their generating plant since the war started 969,000 KW., equal to 1,300,000 H.P., representing an addition of generating power to the 76 stations of 114 p.ct. This figure only includes part of the increase, as many large works added in greater proportion to their own private generating plants. Most of the new plant was required for power purposes; but in the Sheffield area a large part was utilized directly for electric furnaces. Where the load upon the stations was for lighting and domestic heating, it largely fell off owing to the lighting and heating restrictions. Reference is made by Mr. Ram to the uncertainties as to the immediate prospects of development, owing to the probability of the control of the whole industry being placed under a new department. Of course, the difficulties of running electric stations increased considerably during the war. One of the lessons that has been learnt is that women are quite capable of attending to important sub-stations for converting from three-phase supply to direct current for traction and general distribution; but before compulsion operated, there were not many engineers who would have cared to make the experiment.

Increased Industrial Uses of Electricity.

The war had its lessons in the enlargement of the industrial use of electricity, just as it had in the case of gas. Electrical equipment on a large scale was put in at a number of explosive and filling factories. Great care had to be taken in these places, and was taken in most of them, to prevent explosions; but in other cases otherwise good work was rendered highly dangerous by being improperly finished off. Mr. Ram found pipe-ventilated motors in use with no pipes connected, and even forced-draught motors with no pipes, but an outlet in buildings with much highly inflammable, if not actually explosive, material close by, and where the effect of a burn-out of an armature would have been to blow a torrent of sparks into the room. Fortunately no case of explosion or fire has been attributable, so far as can be ascertained, to any installation or defect therein. As to the applications of electricity apart from power, the most striking development has been the use of electric energy for furnace work, principally in steel manufacture for the making of high-grade special steels and alloys. The furnaces run mostly from ½ ton to 10 tons capacity, though a few are still larger. Success in their use depends very much upon skilled attendance, electrical as well as metallurgical. With most patterns of furnace, the pressure used is about 90 volts for melting—being subsequently reduced to 70 volts. The current required is very large, depending upon the size of the furnaces and the electrodes. The large current necessitates the provision of a transformer room situated as close as possible to the furnace. The main supply is, of course, high tension—in many cases, at 11,000 volts. Most unfortunately, the equipment of these transformer rooms in several instances was carried out in a dangerous manner. The apparatus was badly arranged; and the protection of the high-tension conductors was totally inadequate—these being treated as of no more consequence than if at 100 volts. Smaller furnaces have been tried for brass making and casting; but direct heating by the arc appears to present some difficulties. Arc furnaces are also employed in the manufacture of calcium carbide, phosphorous, carborundum, sulphate of lead, &c. Electric resistance furnaces are also being tried for the making of crucible steel by heating crucibles from the outside. This will be an expensive process. Hardening furnaces, in which the current is passed through a bath of salts, are being used for hardening tools. These are comparatively small; and the primary current applied to the transformer may be (say) only 200 volts. Electric heating has been developed in several new directions; among which may be mentioned that of cardboard box manufacture. Other new places for the direct use of electric energy include the electrolytic manufacture of certain explosives and of chlorine and oxygen, and for the recovery of tin from scrap. At least one plant was installed for the manufacture of nitric acid by obtaining nitric oxide from the air by means of the electric arc. Several installations have been put up for depositing fumes and dust by means of high-tension electrical discharge. Mr. Ram says the use of electricity for welding in industry increased very much during the war; but he found a number of welding machines in different works where serious danger existed.

Electric Lighting of Factories and Shops.

Another section of Mr. Ram's report that is interesting contains references to factory and shop lighting by electricity. For many years where electricity was used for factory lighting, there was dependence on arc lamps for general illumination, with the attendant trouble of trimming and cleaning, and expense of carbons; and wasteful carbon filament lamps were employed for local lighting. Incandescent gas lighting, especially high-pressure, has had very considerable adoption in factories; and we are not without good hope that it will have a still larger application. But this is how Mr. Ram refers to it: The improvements which were effected some years ago in gas lighting would probably have led to gas largely superseding electricity for factory lighting had not the metallic filament lamp been introduced just in time to re-establish the "relative advantages" of electricity. Of course, Mr. Ram is an electrician. The so-called "half-watt" or gas-filled lamp, he says, has further improved efficiency. But we would call Mr. Ram's attention to two points about incandescent gas lighting, because they bear upon what he subsequently has to say. The first point is that the inverted incandescent gas-lamp has not the same high intrinsic brilliancy as the gas-filled and ordinary metallic filament lamp; the quality of the light, too, is better for the eyes; and it has from the larger surface of the source of light better distribution efficiency. Mr. Ram confesses that he has seen some very bad examples of lighting with the gas-filled lamps—the lamps being unscreened, and placed where they cause a glare, which is probably harmful to the eyes of the persons employed. He also points out that similar unscientific and harmful examples of electric lighting may be seen by anyone in many of the shop windows in the West-end at the present time. Unshaded lamps are placed where they shine into the eyes of the onlooker, causing such a glare that they fail utterly to show up the goods in the window, although in a blaze of light. It only shows how badly these shop-keepers are electrically advised.

Economy of Coal and Labour.

We have received an attractively arranged pamphlet from Messrs. Goodall, Clayton, and Co., Ltd., of Leeds, in which the advantages claimed for and obtained by everyday working of the Leeds intermittent system of vertical retorts, together with Settle's downward steaming process, are succinctly summarized under the title of "Economy of Coal and Labour." After a reference to the present-day need for economy in view of high prices, and the conservation of coal as a national duty, the special features peculiar to the system are set forth. Next is a typical analysis of a 500 B.Th.U. gas, of which an increase of 50 p.ct. by weight is obtained, as compared with ordinary horizontal retort working. The residuals comprise a coke of excellent quality (95 p.ct. being saleable as "large"), 18·7 gallons of tar containing only 40 p.ct. of pitch, and the equivalent of 28 lbs. of ammonium sulphate, per ton of coal carbonized.

An Automatic Heater.

The "Acorn" automatic gas-fire, which is being introduced by Messrs. Rathbone, Sard, & Co., of Aurora (Ill.), is of the mantle type, with heating elements arranged horizontally; and it is stated by the makers that the mantles are composed of material superior to that in ordinary heating elements of this kind, and are constructed in a manner to permit incandescence to permeate the entire mantle. The fire is made in seven-mantle and ten-mantle sizes; and laboratory tests by the manufacturers showed a gas consumption of from 22 to 26 c.ft. per hour. The main point about the appliance is, however, the automatic gas control; an eight-day clock arrangement being provided which enables the householder to set the exact time at which he desires the appliance to start heating-up and to shut-down. If it is wished to light-up the fire at 6 o'clock in the morning, the clock is set the previous night at that figure on the dial; and without further attention, the clock-control will operate at 6 o'clock, and the heat starts-up. If the time required for heating the room to the required temperature is half-an-hour, the clock is set accordingly, and again operates and closes the valve at 6.30.

DAVIS GEYSERS.

A new edition of the Davis Geyser Catalogue embraces particulars, prices, and illustrations of a large variety of these useful appliances manufactured by the Davis Gas-Stove Company, Ltd., of No. 60, Oxford Street, W. The contents of the catalogue are well set out; and glancing through them special features may easily be noted.

For instance, there is the "Shamrock," an already widely known inexpensive "sealed" type geyser—that is, so constructed that the water cannot possibly come into contact with the combustion gases, and therefore runs out of the machine as pure as it flows into it. This has recently been improved by being fitted with a detachable interior, and by the adoption of the double-handed principle, so that they can be fitted either right or left hand as convenient. Where, for reasons of expense, it may not be desired to instal a sealed geyser, the "Thistle" can well be substituted. It is of the "open" type—*i.e.*, the inflowing water descends in a shower, stream, or film, and is heated by coming into direct contact with the hot gases arising from the burner flames. The "Thistle" also has been improved by being made double-handed.

An entirely new and well-made sealed type machine is the "Walton" bath-heater, which has been designed for the benefit of those living in country districts where an inadequate supply of gas may prevent the installation of a geyser. Once installed, the heater is always full of water, so that there is no risk of its burning through careless use. It is pointed out that the chamber is so constructed that the utmost heating efficiency is secured from the gas consumed; the flames and heating surfaces being so disposed that all the available heat is utilized to maximum water-heating advantage. Another new sealed type is the "Oxford" water-heater, which has been designed to supply small quantities of hot water for lavatory and ordinary domestic services. It is intended to be fixed over a sink or basin; and the gas supply may be run from the nearest bracket. There is a ball-valve, so that the water never has to be turned on. The heater is fitted with a luminous burner and thermostatic valve, which lowers the gas-flame as the temperature of the water rises, and increases the flame when cold water runs into the apparatus to replace the hot water drawn off.

THE SHIPPING AND ENGINEERING EXHIBITION.

It is announced that the Shipping, Engineering, and Machinery Exhibition, now being held at Olympia, has proved so successful that it has been decided to keep it open until Tuesday next, the 21st inst., instead of closing it this week, as already arranged. Judging by the attendance last Saturday afternoon, the claim to success is fully justified; and upon this, congratulations must be extended to Mr. Frederic W. Bridges (the Secretary and Organizing Manager), and all those connected with the exhibition. The success from the attendance point of view, it may at once be said, is deserved, as the display is one for which the huge space available in Olympia has proved not a square inch too great, and much trouble must have been involved in getting it together. The exhibition had been arranged to take place in 1914; but war broke out within a few weeks of the date fixed for the opening, and the scheme remained in abeyance until the signing of the armistice, when active preparations were at once resumed. They have resulted in the collection of some hundreds of exhibits, anything like a close inspection of which will occupy the visitor for a very considerable time—before the expiry of which he may be inclined to forget how indispensable has been its aid to him in his task, and to cease to congratulate himself upon being the possessor of an "Official Catalogue" weighing over 2 lbs.

Bearing so comprehensive a title as the exhibition does, it goes without saying that appended to the stalls are the names of a number of firms familiar to readers of the "Journal." Shipping, in its wider sense, may not directly concern us, though to anyone the beautiful models are well worth a visit. With engineering and machinery the case is different. It is, of course, quite impossible to detail all the things that would be likely to interest a gas man; but mention may be made of one or two names. The Aerograph Company, Ltd., and Aerostyle and Lithos, Ltd., draw attention, by means of attractive exhibits, to their spray-painting appliances; while the British Oxygen Company, Ltd., show in operation the processes of oxy-acetylene welding and oxygen metal cutting. Messrs. Thomas & Bishop, Ltd., of No. 37, Tabernacle Street, E.C., exhibit samples, and give demonstrations, of "Cling-Surface" (which enables a belt to be run quite slack at all loads) and "Permac." The latter is used for making leak-tight joints—easily, and at low cost. "Permac" is supplied in the form of a powder, which is mixed to a stiff putty with boiled oil; and this putty is smeared on to the surface of the joint, or on to the flange on the pipe. The other flange is then brought into position, and the nuts are screwed up. Full pressure may, it is said, be turned on at once, without the slightest fear of the joint leaking or of blowing-out, for the material will stand any pressure the pipe itself will stand without bursting. Samples are shown by the Interlock Metal Hose Company of flexible tubing in bronze, brass, steel, and aluminium for steam, oil, tar, gas, &c. The James Keith and Blackman Company, Ltd., make a good display of their fans and blowers; while Venturi meters, steam-meters, air-meters, and other of their well known appliances can be studied at the stand of Messrs. George Kent, Ltd. A one-ring gas-cooker is to be seen in operation at the stand of the London Warming and Ventilating Company, Ltd.

CITY AND GUILDS EXAMINATIONS PROGRAMME.

Prospective candidates will be glad to learn that the programme is now ready for the session 1919 20 of the examinations of the City and Guilds of London Institute (Department of Technology). It is published by John Murray, of Albemarle Street, W.; and the price is 2s. 6d. net.

It will be recalled that the Institute have agreed with the Board of Education upon a scheme (to apply to England and Wales only) whereby the examinations in technology in grades lower than the Final Examination will be gradually discontinued, with certain named exceptions—which, however, do not directly interest "Journal" readers. Therefore no examinations in Grade I. of three-grade or of two-grade subjects will be held in 1920. But candidates in a subject in which the syllabuses are arranged in three grades may enter for the examination in Grade II. if they have passed in Grade I. previously, or are qualified by the regulations; and those taking a two-grade subject may enter for the Final Examination directly. In 1921 the Final Examinations only will be held.

The programme contains the general regulations for the registration of classes and the examination of candidates, together with the syllabuses. The names of Advisory Committees are also given; and it is pointed out that the Institute are able to avail themselves of the advice of the Council of the Institution of Gas Engineers. Among the Honorary Consultative Examiners is Mr. Charles Hunt. The Acting Examiners are: "Coke and Bye-Products Manufacture," Mr. D. V. Hollingworth; "Coal Tar Distillation and Crude Intermediate Products," Mr. W. H. Coleman; "Intermediate Products for Dyes and Colouring Matters," Dr. J. C. Cain; "Gas Engineering," Mr. Samuel Glover; "Gas Supply," Mr. Walter Hole; "Gas-Fitting," Mr. H. Kendrick; and "Heating and Ventilating Engineering," Mr. A. H. Barker.

The dates fixed for the various examinations are: "Carbonization of Coal and Manufacture of Coal Products"—Coke and Bye-Products Manufacture, Wednesday, April 28; Coal Tar Distillation and Crude Intermediate Products (written), Thursday, April 29; Final (practical), Saturday, May 1; Intermediate Products for Dyes and Colouring Matters (written), Thursday, April 29; Final (practical), Saturday, May 1. "Gas Engineering," Saturday, April 24. "Gas Supply," Saturday, May 8. "Gas-Fitting" (written), Monday, April 26; Grade II. and Final (practical), Saturday, May 1. "Heating and Ventilating Engineering," Grade I., Friday, April 30; Grade II. and Final, Wednesday, April 28. A list is given of suitable text-books and works of reference for students.

Among the special prizes, the Society of British Gas Industries again offer £3 3s. and £2 2s. to the first and second candidates respectively at the final examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting," provided candidates are eligible under the regulations. The Coke-Oven Managers' Association offer prizes of £3 3s. and a silver medal, of £2 2s. and a bronze medal, and of £1 1s. to the first, second, and third candidates respectively at the Final Examination in "Coke and Bye-Products Manufacture." The Institution of Heating and Ventilating Engineers offer three prizes in the Final Examination and three in Grade II. Examination, in "Heating and Ventilating Engineering."

The Elimination of the Chimney Stack.

An addition has been made by the British Commercial Gas Association to the special series of reconstruction numbers of "A Thousand and One Uses for Gas"—several of which have been written particularly for the architectural profession, and others intimately concerned with building and town-planning schemes. This new issue deals with the elimination of the chimney stack in new houses, by the fitting of built-in gas-fires in place of ordinary coal-grates, and the advantages thereby gained. Mr. Edwin J. Sadgrove, the President of the Society of Architects, contributes an article, in which he contends that the conditions of home life in the future ought to be a marked improvement upon those of the past; and he shows how much gas can do to make them so. He is, in fact, so convinced of the benefits and advantages to the community to be derived from the use of gas instead of coal, that he declares it to be his intention to "practice what he preaches" in connection with all housing and re-building schemes passing through his hands. This is testimony that the gas industry will appreciate. With regard to the main contents of the issue, acknowledgment is made of indebtedness to Major Cornelius Wheeler, to Mr. H. H. Creasey, and to the Editors of the "Journal" and the "Builder," for the basis of most of the detailed descriptions given of buildings designed for the entire elimination of the chimney breast and chimney stack, and their replacement by small gas-flues in the thickness of the walling There are also, as a supplement, a large number of photographs of modern gas-fires.

THE MEANING OF THE BEILBY REPORT.

PROBLEMS CONCERNING MANUFACTURE.

By Engineer.

In the "Journal" for Sept. 23, there was an article in which a suggested basis for charging for gas was discussed and analyzed.* Taking the basis referred to and adhering to the unit then suggested—viz., 100,000 B.Th.U., the author now intends to investigate some of the manufacturing problems. When the word unit or gaseous unit is used, it will refer to that above-mentioned.

Considerations Affecting the Choice of a Calorific Standard.

In considering the question of producing gaseous units, as apart from thousands of cubic feet, it is clear that all undertakings will not be in a position to have free choice, and may therefore be unable to produce the quality of gas which is most attractive financially. For instance, the following factors will influence the decision:

(1) The class of coal which can be conveniently obtained at a reasonable price.
(2) The type and capacity of the various pieces of plant at the works, and the proportion represented by water gas or vertical retorts.
(3) The capacity of the distribution system.
(4) Where new plant is to be purchased, the rate of interest to be paid on the capital expended.
(5) The demands of the district; the special demands of certain trades and industries; or, generally, the grade of gas required by the consumers.

These are all factors to which serious consideration must be given when deciding the calorific value, and must be taken in conjunction with the actual manufacturing cost. Their importance cannot be measured by arithmetical standards. For instance, the distribution system of an undertaking selling 550 B.Th.U. gas to-day may not be capable of coping with a 400 B.Th.U. quality, consequent on an increase of about 25 p.ct. in quantity. *Per contra*, an undertaking selling low-grade gas to-day possesses a potential value in its distributing system when it proposes to increase the calorific value.

This article would become unduly long if these intangible considerations were more fully discussed; but the line of thought has been sufficiently indicated.

Cost of Manufacture of Various Grades.

We will now consider the method of arriving at the cost of manufacturing one unit (100,000 B.Th.U.) of various grades of gas, and tabulate the results. The figures are all average results, and costs which may be looked for to-day; but the writer wishes to give the method rather than draw any moral from the actual figures in the results.

"A" undertaking, selling 550 B.Th.U. gas; all coal gas; coal at 45s. per ton; make of gas, 12,000 c.ft.; coke for sale, 10½ cwt. at 40s. net; tar, 10 gallons at 4d.; liquor (or equivalent), 30 gallons at 1d.

"B" undertaking, selling 460 B.Th.U. gas, made from an admixture of 60 p.ct. of coal gas of 570 B.Th.U. and 40 p.ct. of blue water gas; same prices for coal and residuals, but make per ton reduced to 11,400 c.ft. [For details of the water gas costs, refer to a later table.]

"C" steaming vertical retorts, making 24,000 c.ft. per ton of 400 B.Th.U. gas; coal and residuals at same prices; coke for sale, 8½ cwt.; tar, 20 gallons; liquor, 38 gallons.

"D" undertaking selling 400 B.Th.U. gas, similar to "B," but make of 60 p.ct. of water gas of 300 B.Th.U., and 40 p.ct. of coal gas of 550 B.Th.U.

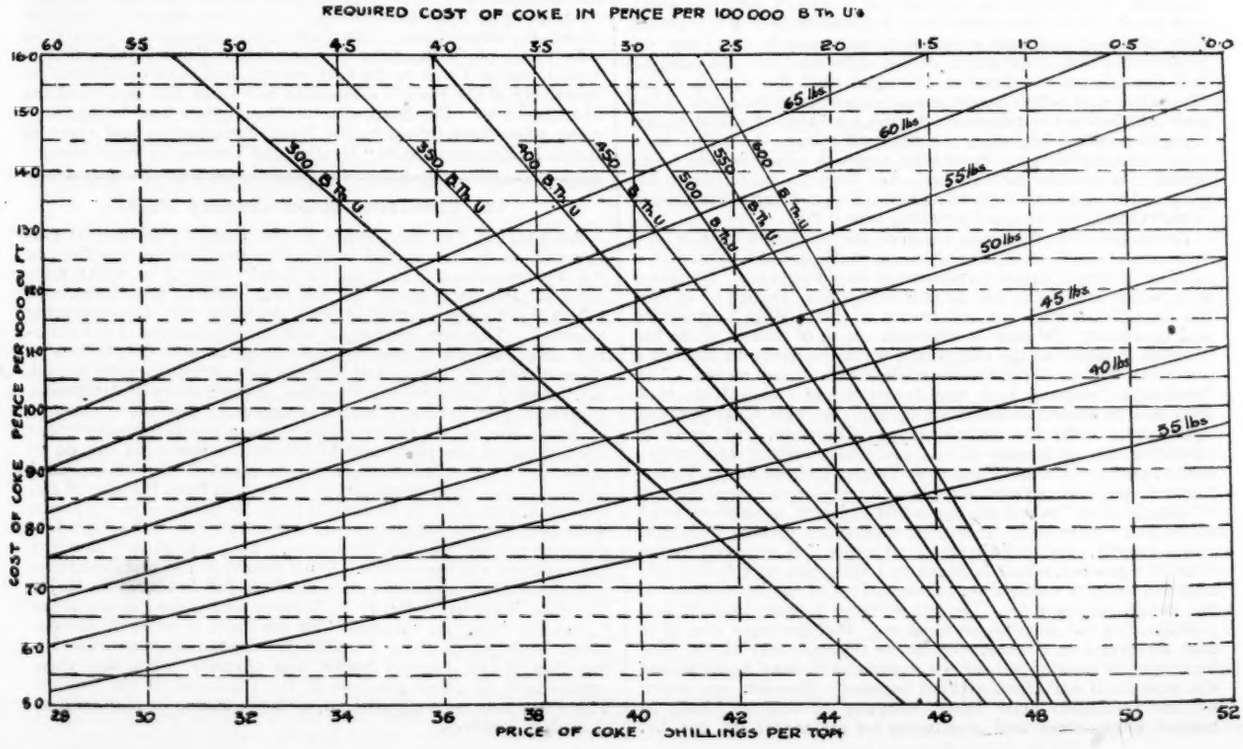
—	Cost into Gasholder. Pence per 100,000 B.Th.U.					
—	A	B		C	D	
Quality in B.Th.U. . .	550	460		400	400	
Quantity to make 1 unit .	182	217		250	250	
		130 c.ft. Coal Gas.	87 c.ft. Water Gas.		100 c.ft. Coal Gas.	150 c.ft. Water Gas.
Coals, &c.	8·19	6·16	1·08	5·63	4·74	1·86
Less residuals	4·88	3·67	0·01	3·35	2·82	0·01
Net coals, &c.	3·31	2·49	1·07	2·28	1·92	1·85
Carbonizing wages . . .	0·82	0·62	0·26	0·40	0·48	0·45
Salaries	0·11	0·07	0·04	0·11	0·04	0·07
Purification	0·09	0·06	0·01	0·10	0·05	0·01
Repairs and renewals—						
Retorts, &c.	0·91	0·62	0·18	0·94	0·48	0·30
General works . . .	0·54	0·39	0·26	0·75	0·30	0·45
Steaming costs	—	—	—	0·20	—	—
Total per unit	5·78	4·25	1·82	4·78	3·27	3·13
		1·82			3·13	
		6·07			6·40	
Total per 1000 c.ft. . . .	31·48	28·00		19·12	25·60	

In general, the above figures show what we should expect—viz., that vertical retorts steamed show the least cost into the holder, even when taking into consideration its lower calorific power.

In preparing the above estimates the carbonizing wages have been based on the tonnage of coal handled, which is obviously a better method than basing it on thousands of cubic feet. Salaries would be the same per unit for all classes; for the real criterion is the units sold.

The purification is based on the thousands of cubic feet, with necessary adjustments lowering the costs per 1000 c.ft. for gas from vertical retorts.

The repairs and renewals should always for any investigation


REQUIRED COST OF COKE IN PENCE PER 100 000 B Th U's
60 55 50 45 40 35 30 25 20 1·5 1·0 0·5 0·0
160 150 140 130 120 110 100 90 80 70 60 50
COST OF COKE PENCE PER 1000 C FT
300 B.Th.U.
350 B.Th.U.
400 B.Th.U.
450 B.Th.U.
500 B.Th.U.
550 B.Th.U.
600 B.Th.U.
65 lbs
60 lbs
55 lbs
50 lbs
45 lbs
40 lbs
35 lbs
28 30 32 34 36 38 40 42 44 46 48 50 52
PRICE OF COKE SHILLINGS PER TON

* Before proceeding, the writer would draw attention to two misprints in the article. On p. 663, second column, about half-way down, 76 c.ft. should have read 7·6 c.ft. On p. 664, first column, and fourteen lines from the bottom, 5s. 3½d. should read 5s. 2½d.

of this kind be divided into two parts. The retorts repairs have been taken on the "ton of coal" basis, with a higher cost per ton when makes are heavier. The general works repairs should be on a "cubic feet" basis, since one million thermal units of low-grade gas would require more handling in the works than the same quantity of high-grade gas, after the actual manufacture in the retort-house.

Capital Expenditure.

It is obvious the sums required to pay interest on capital will be less per unit for a high-grade gas, although it is difficult to give figures without knowing the circumstances, and each case must be treated on its merits. For example, the amount required for verticals will be more than for horizontals, although on the unit basis this becomes less marked, owing to the large increase in thermal units obtained from a ton of coal from steamed verticals. As pointed out above when discussing repairs, more exhausting, purifying, condensing, and gasholder capacities are required for a unit of low-grade gas than for the same quantity of high-grade gas.

On the distribution side, high-grade gas needs less expense on mains and services. No material difference will, however, be shown in meters and stoves, for the same number of consumers will be dealt with in either case. The difference is that each will use a comparatively small quantity of the higher-grade gas. This leads to the consideration of the cost of distribution.

Cost of Distribution.

We will look into the cost of dealing with three grades of gas on the unit system; the grades being 400, 475, and 550 B.Th.U. respectively.

With regard to wages and salaries of distribution, the costs per unit would not vary, since in selling a certain number of units we should need the same staff (both indoor and outdoor), because our consumers would require the same services from the officials independently of the grade. The same remarks apply to the collection and management and general charges.

With regard to mains and services, the repairs and renewals would be less per unit for a high-grade gas if a new system were in contemplation. In an existing installation there would be no material difference; but a potential saving would exist owing to the system being quite capable of increasing its business and lowering its *pro ratâ* cost by increasing the calorific value supplied.

The repairs of meters, stoves, and coin-meter fittings would probably be less with a high-grade gas. There is less gas passing through them; and there is no doubt that in the case of meters they would last considerably longer with a rich gas than with one devoid of oily matter. The same can be said of the mains and services. But, as against this, many gas managers have reported some tremendous reductions in naphthalene deposits, owing to the introduction of low-grade gas. In all these matters, the time-element comes in; for the mains, services, meters, and stoves would ultimately wear out if no gas whatever were sold.

In the following table, the potential value of mains and meters is taken into account. In considering a charge, however, the initial cost of conversion in the district must not be overlooked, as this might be a serious factor.

Cost of Distribution in Pence per 100,000 *B.Th.U.*

Quality of gas, B.Th.U.	400	475	550
Quantity to make 100,000 B.Th.U.	250	210	182
Salaries and wages	0·32	0·32	0·32
Repairs and renewals—			
Mains and services	0·50	0·42	0·36
Meters	0·48	0·40	0·34
Stoves	0·36	0·36	0·36
Fittings	0·09	0·09	0·09
Management, rates, and all other charges	1·50	1·50	1·50
Total costs	3·25	3·09	2·97

It is seen from the table that the total difference is 0·28d. per 100,000 B.Th.U. This would be the maximum saving in certain circumstances, but in many cases, this difference would clearly not arise.

Before going into the question of costs of various qualities of water gas, the reader will have observed the necessity for accurate and careful costing, before a decision of any value can be arrived at. Neglecting overhead charges, costs are made up of wages, stores, and invoices. It is absolutely necessary that the dissection of these items should be carried out with the greatest accuracy, and that their total sum (including overhead charges) should be the gross expenditure of the undertaking during the period under review—subject to any adjustment necessary for the purposes of the revenue account proper.

The Quality of Water Gas.

It is very desirable that the responsible officer should be enabled to readily ascertain the costs of water gas, both blue and carburetted. In the past, this has been of value, as it has enabled the gas to be used as a diluent or as an enricher, depending on circumstances. If used as a diluent, to what percentage could it be used, and at what point did it cease to be economical in view of the reduced coal gas make per ton which would follow if this critical percentage as a diluent was increased? If used as an enricher, at what price of oil did it pay to use certain quantities of oil per 1000 c.ft., in order to increase the make per ton by corresponding amounts in the coal-gas plant?

In producing gas for sale in British thermal units, we are faced with exactly similar difficulties, with an added problem to solve. With varying prices of oil and coke, which grade of water gas shows the most thermal units for 1d. The writer has prepared a chart and table—the former referring to coke, and the latter to oil. By adding the results together the cost of materials per gas unit of 100,000 B.Th.U. can be ascertained.

The Coke Chart.

The use of this chart is quite simple. At the base are plotted the various coke prices, ranging from 28s. to 52s. per ton. A set of inclined lines rising from left to right represent the various quantities used, from 35 lbs. to 65 lbs. per 1000 c.ft. If this quantity includes that used in the boiler, the price taken is the true average of coke and boiler fuel, having regard to the relative quantities used. If steam costs are to be added separately these figures should apply to the generator only. The lines that slope down from left to right represent the various qualities of gas, and on the top is a scale of the required costs per unit in pence.

To trace the operation, place a pencil at the price per ton figure; move it vertically until it meets the quantity line; then move horizontally until it meets the gas quality line; and then vertically to the top scale to read the answer. If the price per 1000 c.ft. is needed, the pencil is moved to the left after its vertical travel; and, on meeting the quantity line, the answer is read on the vertical scale.

Thus for coke at 46s. and 55 lbs. per 1000 c.ft. used, making 550 B.Th.U. gas, the cost of coke is 2·465d. per gas unit.

The Oil Table.

The following table gives the cost of oil in pence per gas unit,

Table of Costs of 100,000 *British Thermal Units from Oil at Varying Prices and Different Rates of Consumption.*

Quantity of Oil Used.	Approximate Calorific Value.	Price of Oil per Gallon in Pence.								
Gallons Per 1000 c.ft.	B.Th.U.	4	5	6	7	8	9	10	11	12
½	370	0·541	0·676	0·812	0·947	1·082	1·217	1·353	1·488	1·623
¾	400	0·750	0·937	1·125	1·312	1·500	1·687	1·875	2·062	2·250
1	430	0 930	1·162	1·395	1·628	1·860	2·092	2·324	2·558	2·791
1¼	460	1·087	1·359	1·630	1·902	2·174	2·445	2·718	2·989	3·261
1⅜	490	1·224	1·530	1·836	2·142	2·448	2 754	3·060	3·366	3·672
1½	520	1·347	1·684	2·021	2·357	2·694	3·032	3·368	3·704	4·041
2	550	1·454	1·817	2·181	2·545	2·908	3·271	3·634	3 999	4·362
2¼	575	1·566	1 957	2·349	2·740	3·132	3·524	3·914	4·306	4·698
2½	600	1·667	2·084	2 500	2·917	3·333	3·750	4·167	4·584	5·001
2⅞	620	1·776	2·220	2·664	3·108	3·552	3·996	4·440	4·884	5·328
3	640	1·876	2·345	2·814	3·283	3·752	4·221	4·690	5·159	5·628
3¼	660	1·972	2·465	2·958	3·451	3·944	4·437	4·930	5·423	5·916
3½	675	2·074	2 592	3·111	3·630	4·148	4·666	5·184	5·704	6·222

based on the average calorific values which one might expect to make when using varying quantities of oil, and covering prices per gallon varying from 4d. to 1s. These prices include the original 300 B.Th.U. in the blue gas, and do not therefore strictly represent the thermal units supplied to the gas by the introduction of oil. But the figures are correct, inasmuch as they have to be added to the cost of coke to get the total materials cost. If the calorific value of the gas made for a given number of gallons per 1000 c.ft. is known to be more or less than that in the table, then the costs can be adjusted accordingly.

Total Costs of Water Gas.

We will now investigate the total costs of water gas of varying qualities, using the chart and table as a basis for ascertaining raw materials costs.

We will take the cost of manufacturing one gas unit of each of the following grades—viz., 300, 400, and 550 B.Th.U. respectively, and assume in each case that coke is 42s. per ton, that 55 lbs. of it are used in the generators and boilers, and that oil is 8d. a gallon.

The next table, taking figures at average present-day costs, is instructive in many ways. It shows that carburetted water gas, although over 15d. per 1000 c.ft. dearer than blue gas, comes out cheaper, having regard to its thermal value, but not on account of the raw materials. The saving is entirely in wages and repairs; for it is clear that these items would not be any more for a rich gas than for a poor one, except for the small adjustment noted for handling oil.

The writer has no wish, however, to force the acceptance of these figures; he is merely indicating a method of arriving at a comparison. In doing so, a result has been produced which proves what has previously been drawn attention to by the writer

Quality in B.Th.U.	300	400	550
Quantity to make 100,000 B.Th.U.	333	250	182
Cost of coke . . . . . pence	4·125	3·094	2·250
,, ,, oil . . . . . ,,	Nil	1·500	2·908
Total materials	4·125	4·594	5·158
Less oil tar and pan coke . . .	0·025	0·084	0·148
Net for raw materials	4·10	4·51	5·01
Salaries	0·10	0·10	0·10
Wages at 3d. per 1000 c.ft. . . .	1·00	0·75	0·545
,, handling oil	0·00	0·02	0·03
Purification at 0·1d. per 1000 c.ft..	0·03	0·02	0·02
Repairs to generators at 2d. per 1000 c.ft.	0·67	0·50	0·36
Repairs to general works, purifiers, meters, holders, at 3d. per 1000 c.ft..	1·00	0·75	0·545
Cost into holders per unit . . .	6·90	6·63	6·61
,, ,, per 1000 c.ft.. .	20·70	26·52	36·32

in considering the economic aspects of this report—viz., that it will not always pay to make gas of low calorific power.

In a plant of a million cubic feet a day, the difference calculated on the average would represent about £5 per day between the cheapest and dearest total costs; and this difference might be more than overcome by other considerations—*e.g.*, the required calorific power, having regard to the calorific value and the percentage of the coal gas in the mixture.

The capital cost of the plant should not be overlooked; for here, again, we should get a saving per gaseous unit when making a richer gas. Thus the interest at 5 p.ct. upon the capital cost per unit of 100,000 B.Th.U. would be about 0·3d. when making 550 B.Th.U. gas, and 0·4d. when making 400 B.Th.U. gas. If blue gas were being made, a cheaper type of plant would come into operation, with an interest charge of probably less than a farthing per gaseous unit.

Sufficient has now been written on these matters to indicate the lines of investigation which must be undertaken before the responsible official will be in a position to come to a decision on the question of declared calorific value. To many, the position is tolerably clear, for the cost of water gas is so low—even when taking its power into account. But the notes on water gas in this article may be of value to those who have been hesitating on the question of the most desirable calorific value to manufacture.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Programme for the New Session.

A full programme has been arranged for the forthcoming session by the London and Southern District Junior Gas Association. At the opening meeting, at the Westminster Technical Institute, on the 24th inst., an address will be given by the President (Mr. S. B. Chandler, of the South Suburban Gas Company); and after light refreshments, the remainder of the evening will be devoted to social intercourse. The subsequent fixtures are:

1919

Nov. 8.—Visit to the Bromley-by-Bow Works of the Gas Light and Coke Company.

Nov. 28.—Lecture by Major Philip Dawson, M.Inst.C.E., E.E., and M.E. "Electric Traction." Illustrated by lantern slides.

Dec. 5.—Visit to the works of Messrs. W. Sugg & Co., Ltd., Westminster.

Dec. 19.—Paper by Mr. J. G. Clark.

1920

Jan. 10.—Visit to the Old Kent Road Works of the South Metropolitan Gas Company.

Jan. 30.—Lecture by Dr. Hartley, of the Richmond Gas Stove and Meter Company.

Feb. 7.—Visit to the Gas-Works of the Royal Arsenal, Woolwich.

Feb. 27.—Paper by Mr. D. Balfour Bain, Assoc.M.Inst.M.E., of Messrs. James Keith Blackman Company, Ltd. "Gas Boosting."

Feb. 28.—Dinner and concert.

Mar. 13.—Visit to the Industrial Appliance Show-Rooms and Demonstration Workshops of the Gas Light and Coke Company, Goswell Road, E.C. Mr. B. W. Brooks will conduct interesting tests and explain processes.

Mar. 26.—Paper by Mr. E. G. Stewart. "Water Gas."

Apr. 9.—Visit to the works of Messrs. George Glover & Co., Ltd., at Chelsea.

Apr. 23.—Paper by Mr. L. F. Tooth. "Gas Apparatus and the Late War."

May 14.—Annual general business meeting.

June 19.—Visit to Windsor Royal Gas Light Company, at Windsor.

The Professional Syndicate of the French Gas Industry announce, through the "Journal des Usines à Gaz," the formation of a Joint Committee of the gas-works in the war zone which sustained damage, and of a Technical Commission to examine, and forward to the proper quarters, all claims for reparation and reconstruction.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Opening of the Session.

The Opening Meeting of the Scottish Junior Gas Association (Eastern District) was held in the Heriot Watt College, Edinburgh, on Saturday last—Mr. L. FARQUHAR, of Alloa (the President), in the chair.

THE PAST PRESIDENT'S MEDAL.

The PRESIDENT, referring to his appointment, said it was an honour which he valued very highly, as his interest in the Association dated back to his apprentice days, when he had attended the meetings in the Heriot-Watt College. The first duty which devolved upon him was the very pleasant one of presenting the Association's medal to the Past-President (Mr. R. B. Waddell, of Polmont), who had occupied the chair during a very trying time. When everything was in a state of chaos owing to the war, and duties claimed all their attention, Mr. Waddell's task was to keep the Association moving. In this he was highly successful; and they all wished him many happy and prosperous years in which to wear the medal.

Mr. WADDELL suitably replied, mentioning that he had been a member of the Association since its inception, and had always regarded it as a very helpful institution.

THE AFTERNOON'S PROCEEDINGS.

The PRESIDENT intimated that he considered it would be better to hold over his Presidential Address until the end of the session, especially as they were fortunate in having with them as lecturer, Mr. R. M'Laurin, of Stirling, who had carried out extensive research work in connection with the destructive distillation of coal. Mr. M'Laurin's subject—"Low Temperature Carbonization"—was particularly opportune at the present time, when the question of the conservation of coal was being pressed upon them.

Mr. M'LAURIN then delivered his lecture, illustrating his remarks from time to time by a chart of the gas plant at Port Dundas, diagrams, and samples of dyes and varnishes, &c.

LOW-TEMPERATURE CARBONIZATION.

Mr. M'Laurin said: It has been customary in the past to divide carbonization processes into two categories—namely, high-temperature carbonization and low-temperature carbonization. This is not sufficiently accurate, as we have an almost complete gradient for high-temperature carbonization to low-temperature carbonization at present in existence. Carbonization conducted at temperatures round about 1000° C. naturally falls under the designation of high-temperature processes; and this designation rightly applies to horizontal retorts, vertical retorts, and coke-oven carbonization. The steaming of vertical retorts naturally reduces the temperature considerably; so much so that I would feel inclined to term this a semi-high temperature process. Following downwards, we arrive at the present so-called low-temperature carbonization processes, such as that known generally as the "Coalite" process, and also the systems of the Tarless Fuel Syndicate, the Del-Monte, the Richardson, and others now being tried. Correctly speaking, these should be termed mid-temperature processes, or semi-low temperature processes; and I will hereafter refer to them as such, and give reasons justifying my doing so. Coming to the foot of the gradient, we arrive at low-temperature carbonization. Apart from the work of scientific investigators, there is not, so far as I am aware, any true low-temperature process, except the one going under my name.

It is unnecessary for me to describe high-temperature processes at a meeting of gas engineers; and it may be invidious for me to describe semi-low temperature processes, beyond stating the general principles upon which they are based—so far as this is necessary for the correct understanding of the subject. This, however, need not detain us long.

Semi-low temperature processes in principle do not differ from high-temperature processes. The Coalite and Tarless Fuel processes are similar to vertical retorts, only the carbonization is done in a much narrower vessel, the walls of which are maintained at a much lower temperature. The tubes or retorts used are, or were, about 5 in. or 6 in. diameter, and the temperature maintained at about 500° C. Tarless Fuel, in addition, applies vacuum to the retorts in order to effect the carrying-off of the products under the most favourable conditions. The Del-Monte and other semi-low temperature processes, working with moving parts, are analogous to shallow charges in horizontal retorts, in that in both cases they rely upon radiated heat. On the plants at present tried, the moving parts are encased in an iron vessel heated externally, and the coal is moved along within it, either by conveyors or small buckets. The important point to note is that the heated coals of the containing vessel are necessarily of very considerable area compared with the area of fuel exposed.

THE M'LAURIN PROCESS.

The M'Laurin process, on the other hand, makes use of a different principle—viz., the heat is conveyed to the coal to be carbonized entirely by the passage of hot gases. It is, in contra-distinction to the other plants, an internally heated plant, and in consequence of this its diameter is not dependent upon the conduction of heat through a bad conducting medium such as coal is. The diameter of my plant is 8 ft. in place of 8 in.

After giving a description of the working of the plant from drawings, Mr. M'Laurin continued: I now proceed to deal with the

results obtained by the different methods, starting with the high temperature products with which you are all familiar, and proceeding downwards to low-temperature products. Taking them in the order of importance assigned to them by the gas engineer, we must begin with gas. An ideal of the past was 10,000 c.ft. of 600 B.Th.U. gas; but it is a fair figure to take for straight high-temperature carbonization. Much has been said and written about the advantages of low-temperature carbonization for gas making; but so far as the evidence goes, I think we must conclude that each drop in temperature makes for a reduction in the illuminating value of the gas given off, and also in the total calorific value. This, of course, does not apply to the lowering of temperature effected by steaming, as in this instance part of the calorific value is obtained at the expense of the coke. It is also possible that some of the hydrocarbons evolved are saved from excessive decomposition. Semi-low temperature processes will yield from 5000 to 7000 c.ft. of gas of from 600 to 800 B.Th.U. Possibly the large yields give the poorer quality of gas. A true low-temperature process gives probably not more than 3000 c.ft. of rich gas. On a calorific basis, one might be fairly safe in allowing for in the gas:

6,000,000 B.Th.U. from high-temperature carbonization,

4,500,000 B.Th.U. from semi-low temperature carbonization, and

2,500,000 B.Th.U. from low-temperature carbonization.

That is only when taking account of the gas evolved from coal on carbonization.

The total volume of unsaturated hydrocarbons escaping in the gas in high and semi-low temperature processes per ton of coal is about the same; but in a true low-temperature distillation, they are only about one-sixth of the volume. The methane from high temperature carbonization is slightly greater in volume per ton of coal than for semi-low temperature processes described. This I should like you to remember, as it helps to explain what is happening in coal distillation. The gas manager values his coke next to his gas. Admittedly, however, the average gas-works coke is very poor stuff—sometimes because of the coal. But even with good coal, it is nothing to boast about. The quantity depends upon the volatile matter in the coal, except when steaming is in practice, when it is naturally reduced.

The high claims of the semi-low temperature processes rest on the quality of the coke which can undoubtedly be produced. The weakness lies in the difficulty of making it continuously of uniform quality capable of standing transit. The quantity per ton of coal is naturally high, as from 9 to 12 p.ct. of the volatile matter of the coal is left in the coke. There is no doubt that any of these semi-low temperature cokes make ideal fuels. They kindle readily, and burn with a pleasant glow, giving out an intense heat, and certainly would if adopted do much to mitigate our fog troubles. From this side, if from no other, they are well worthy of the attention of the gas engineer.

The smokeless fuel produced in the M'Laurin low-temperature process cannot correctly be termed a low-temperature product, nor even a semi-low temperature product. It can only be correctly described as a semi-high temperature product; for it has passed down through the producer zone, possibly reaching a temperature little short of that existing in a steamed vertical.

Volatile Matter.

The volatile matter in the smokeless fuel made at Port Dundas only contained about the same percentage as remains in the horizontal retort coke—viz., about 4 p.ct. The character of the smokeless fuel, however, differs greatly. It is black in place of silver-grey, ignites freely, and burns like the other prepared smokeless fuels which have recently been so much discussed. It has one very great advantage over the chars prepared by other processes, and that is it is easily made of uniform quality. It is hard—generally considerably harder than the coal it has been made from—and sometimes very hard indeed. It has no tarry centre; but it is always uniformly coked to the centre, no matter what the size of the coal is which has been put into the retort. With coals which are not highly intumescing the coke comes out just a little larger than it goes in, often with little pieces binding together. With highly intumescing coals binding takes place; and at the present stage of our experiments, I would not recommend the process for coals of this class. The ease of kindling I consider due to the temperature not being sufficient to convert the carbon into the graphitic state. It is, however, easy to conduct the carbonization in such a way as to effect this change, when a silvery-grey coke results of very considerable hardness, resembling metallurgical coke, and of no use for domestic purposes, as it cannot now be kindled readily by paper and sticks in the ordinary household fashion.

The M'Laurin low-temperature process, with its high-temperature coke, is more likely to prove a rival to the coke-oven than to the vertical retort. In many ways it resembles an elongated beehive oven with a bye-product recovery plant installed. With the plant as installed at Port Dundas, with its water-seal below, we obtained a smokeless fuel which occasionally sparked very badly when placed on a fire; and this difficulty could not be overcome without tearing down the whole of the plant. This, during the war, was out of the question. A smaller unit has been erected at Stirling, to obviate the necessity of wetting the hot fuel; and this has proved effective. The fuel produced in this is now thoroughly satisfactory in every way. In this plant we can at will produce smokeless fuel and metallurgical coke. [Samples were exhibited.]

Ammoniacal Liquors.

The sulphate of ammonia is the next most valuable constituent so far as the gas manager is concerned; and we will now examine the ammoniacal liquors, as far as information available allows. Gas liquors are rather unpleasant to the average nostril, and not very prepossessing in any way. The high-temperature liquors, besides their ammonia, contain cyanides, ferrocyanides, sulphocyanides, &c., and some phenolic bodies, for the most part unexamined, and which colour the spent liquors usually a reddish brown. A very fair average yield per ton of coal is 26 lbs. of sulphate of ammonia. Unfortunately, I can give you no information on the liquors for semi-low temperature processes, beyond the general statement that the yield is only about half the above—viz., 12 to 13 lbs. The M'Laurin process, so far as ammonia is concerned, is not a true indicator for the yields of low-temperature carbonization, as the fuel is afterwards subjected to high temperature and steam in the generator zone of the producer, and the ammonia given off on carbonization. The yields, therefore, vary according to the time of steaming. Results, however, indicate (as theory would predict) that we get the ammonia given off on low-temperature carbonization first, then the ammonia given off on raising to a higher temperature, and finally a small proportion due to steaming. This proportion rises as the steaming is prolonged. Roughly, you may assume the sulphate of ammonia as running between 26 and 36 lbs. If the coal is burned to ash, however, it naturally rises even up to 60 or 70 lbs. per ton of coal; and if we were dealing with coals rich in nitrogen, possibly considerably higher. But this is not the result of low-temperature carbonization, and therefore is outwith the scope of my address.

Cyanide Blue—Dyes.

The low-temperature ammoniacal liquor is, however, very different from high-temperature gas liquor in what it contains and what it does not contain. Regarding the sulphur content, I cannot speak definitely, as we have been in the habit of catching the ammonia in weak sulphuric acid, and thus the H_2S is carried forward in the gas, as is also much of the CO_2. I have here a small sample of the ammonia liquor which we obtain. It is slightly acid. I will now add to it a few drops of ferrous sulphate, which is not free from ferric salt. You will notice no change. You know that in the liquors you are used to, had you added an iron salt, after having removed the H_2S, you would have got a blue precipitate and a reddish brown liquor for the formation of Prussian blue and sulphocyanide of iron respectively. I now add a little solid ammonium carbonate; and as it dissolves you will see the formation of a fine blue colour which steadily deepens, and as it is made more alkaline becomes more violet. Carbolic with ferric chloride would behave very similarly; but the violet colour would soon disappear. This colour will remain for six months without changing. If a piece of white wool is dipped in this liquor and brought to the boil, it comes out dyed a slate colour as you see from the sample I have. With a more concentrated liquor the shade is darker, as sample on the table. These slates can readily be converted into browns of about the corresponding depth, as you see from the patterns submitted. In addition to this, there is still another phenolic body in the ammonia liquor, which can, by very simple means, be converted into a good green, as shown.

I regret that it has been found impossible so far to separate these bodies in a state of purity sufficient for analysis, as they apparently decompose very readily on heating. They are, however, polyhydric phenols of some sort, but evidently complex. A good deal of work has been done on the separation of these dyes; and I believe their separation may soon be satisfactorily effected. Their fastness to light is very considerable—certainly much ahead of what are generally known as the aniline colours. This method of obtaining dyes is an entirely new departure in dye-making. In a sense we might almost say that the dye is presented to us.

Oils and Tars.

The quantity of tar from high-temperature carbonization varied from 6 to 12 gallons. From similar coals on semi-low temperature carbonization they would obtain 14 to 23 gallons and low-temperature carbonization would give about the same amount. The quality of the two tars was, however, widely different. The high-temperature carbonization contained the three primary cyclic compounds—benzene, naphthalene, and anthracene. A light naphtha gave benzene, toluene, and xylene. The anthracene oil contained anthracene and phenanthrene, &c. Among the phenolic bodies it contained carbolic, cresylic, xylenols, &c. very little if any naphthols, and some pyrocresols. They also contained a relatively small percentage of paraffins, olefines, and terpenes. The pitch contained bitumene and free carbons. The semi-low temperature tars were reputed to contain paraffin wax, also paraffin olefins and naphthalenes; and this kind were termed paraffinoids. The compounds were benzene, naphthalene, anthracene, bitumene, and free carbons, and the smallest percentage of carbolic.

The true low-temperature oils differed in containing very complex phenols which dried readily on wood, so far as he could gather differing from any known phenols. Distillation gave a whole series from 190° to 360° C., and the residue was still phenolic. Distillation destroyed the drying properties of these phenols. It

had been impossible so far to work out a constitutional formula for any of them, owing to the difficulty of getting pure bodies. The paraffinoid portion contained paraffin waxes with a melting point about 48° C. The mass of the oil, however, was not really paraffinoid or olefines. Such oils would require to have carbon to hydrogen as 10 to 20 and 22, whereas the hydrogen present to 10 of carbon was about 16; and deducting for the paraffin present, it came down to 14. This brought it near to the turpentines or to cymenes. The boiling point of these paraffin oils ran about 360° C.; and it was difficult to find any hydrocarbons on boiling at this temperature. Paraffin wax was quite evident in the distillation, giving rise to the term paraffinoid. Little residue was left at the finish of the distillation, and what there was was of a greasy nature. The distillation differed considerably from the original oil, indicating that they had been decomposing in the process. It was evident from this that these oils could not have passed through the regions of high temperature.

Reasons for Differences in Products.

Mr. M'Laurin proceeded to follow the course of events in carbonizing by the different processes—this time stepping upwards. Coking coals, it was believed, consisted largely of resinous products; round cannel coals and shales a controversy still continued. For the purpose of the gas manager, they might divide gas fuels through: Shales, cannels, gas coals, and splint coals, non-caking fat coals, caking fat coals, coking fat coals, and anthracites—steam coals. At the top they had coals giving oils on low-temperature carbonization with little phenolic admixture. At each step down the proportion of phenolic products increased until they got to the true coking coals, when the resinous portion predominated. Beyond this they got into the steam coals, where any distillate there was was phenolic or resinous. The anthracites did not concern them here. Every gas engineer was aware that the shales, cannels, and fat coals gave the best illuminating gas and generally the worst coke. Rich gas was therefore obtained from the coals which yielded a tar that gave a large volume of top oil on separation with weak acid. Distillation in the laboratory told them that the top oil distilled over somewhere about 360° C., without leaving much residue behind. This distillate contained a considerable percentage of paraffin wax. If they tried to pass this oil through a red-hot tube, it went to pieces; the tube being almost instantly filled with a deposit of carbon. The portion escaping would almost certainly be richer in hydrogen than the original oil, which they would remember indicated about fourteen atoms of hydrogen to every ten atoms of carbon. In the centre of the coal, distillation was taking place; and the red-hot outer layer of the coal would be as effective as the red-hot tube in promoting decomposition. The red-hot walls of the retort would finish the work. The lower the temperature of the walls of the retort, the less the decomposition. With semi-low temperature processes, part passed over as in the distillation of the top oil in the laboratory; and as this portion contained paraffin wax it gave rise to the impression that the oils were largely paraffinoid. A portion, however, was destroyed—giving rise to free carbon and bodies richer in hydrogen than the original oil; and it was these bodies (possibly largely light olefines and paraffins) which gave the illuminating power to the coal gas obtained by the semi-low temperature processes. Practically the same reasoning held good for the actions taking place in a vertical retort, and particularly when the retort was steamed, as this carried over more of the oils decomposed. The tars in such cases were largely "paraffinoid" because of the decomposition of this portion being greatly reduced. It was easy now to see why the oils became less in quantity, and less paraffinoid in character, as the temperature of the retort was increased. The quantity of free carbon in the tar increased with the increase of temperature; and this they had seen was what happened on passing the top oil through a red-hot tube. Cannel coals gave tars very rich in top oils on low-temperature carbonization. Such coals naturally gave more paraffinoid tars on high-temperature carbonization than coking coals did, as well as very rich illuminating gas.

Phenolic Portion of Oils.

Turning to the phenolic portion of the oil obtained in low-temperature carbonization, he said that in the M'Laurin process this distilled-out or was washed-down; but on a semi-low temperature vertical or Del-Monte type of plant or in a high-temperature vertical or horizontal retort, the outside layer of coal was at 700° or 800° C. before the phenols were being distilled-out. Consequently they had to run the gauntlet of highly-heated carbon layers; and if they escaped destruction here, they had the heated walls of the retort to face before getting into the comparative safety of the draw-off pipe. Assuming that the complex phenolic bodies obtainable from low-temperature carbonization were given off within the heart of such a piece of coal when it was reaching a temperature round about 360° C., the outer layer of red-hot carbon would not let these pass out with any oxygen attached, if it could help it. Therefore they should expect to find, as the external temperatures maintained increases, a gradual reduction in the complexity of the phenolic bodies and a steady increase in the proportion of hydrocarbons—possibly corresponding to the phenolic bodies deprived of their oxygen. This he believed correctly recorded what did happen. True low-temperature tars contained none of the simple aromatic compounds—such as benzene, toluene, naphthalene, anthracene; semi-low temperature carbonization contained some traces; but as the polyhydric phenols and complicated drying phenols disappeared, benzene, toluene, naphthalene, anthracene, phenanthrene, &c., appeared in the tar products. It was his opinion, therefore, that the coal itself contained the nuclei from which the cyclic compounds of the high temperature tars were largely made up, and only a small proportion (if any) was due to the condensation of acetylene or other similar unsaturated hydrocarbons. Resins were composed of phenolic compounds combined with complex alcohols or resino tannols. The phenols known were simpler than those they would have to assume as existing in coal; but this was not an unlikely supposition when they considered that some of the resins had sixty carbon atoms in their molecule. The phenolic bodies contained in resins were carboxy phenols such as

$$C_6H_3\begin{cases}OH\\OH_3\\CH=CHCOOH\ (_4).\end{cases}$$

umbellic acid. Now when such acids were heated, they readily parted with CO_2; and the first gas given off on the low-temperature carbonization of coal was CO_2. Further justification for this assumption lay in the fact that some of the phenols extracted from his low-temperature ammonia liquors gave off CO_2 on heating to somewhere about 150° C. It was well known that pyrocatechol and chloroglumicol were obtainable from the distillation of certain resins. Recent resins gave turpentine on heating a body containing ten carbon atoms and sixteen hydrogen atoms in the molecule. Turpentines readily polymerized; and it did not seem a great stretch of fancy to suggest that terpenic oil obtained by low-temperature distillation was the product of distillation of highly polymerized terpenes in the coal.

Hard and Soft Coking Coals.

Still another point of interest arose here. A noticeable thing about the true coking coals was that they all had an easy fracture; while the non-coking coals were frequently conchoidal in fracture or split like a splint. The hard coals all gave large yields of oil; and when they tended to coke, it was noticeable that the proportion of phenol in the crude oil was relatively high. In true coking coals the proportion of phenol was always high; and in some coals which coked but gave little gas or oil it was noticeable that the oils they gave were almost entirely resinous. Even the top oils from the coking coals were more resinous than the top oils from the hard coals. Mr. Conacher had examined a large number of shales and cannels under the microscope, and found varying proportions of yellow bodies which he considered resinous; and from the amount of these yellow bodies he could predict with considerable precision the possible yield of oil—evidently, therefore, the yellow bodies from the distillable portion of the coal. If these were resins, they must assume that in soft coking coals the proportion was not so great as in the hard coals, or that the resin was of a different nature. He suggested that the latter was the truer explanation.

In making varnishes, they got two types of varnish—the oil-varnish like linseed oil, which dried with an elastic coating, and the resin varnishes which dried with a brittle coating. He suggested that the hard coals were on the linseed basis and the soft coals on the resin basis—that was, the one was largely a chain compound while the other was based on trinene, and was therefore a ring compound. Resin would account for the brittle fracture of the soft coals, while the elastic varnish would account for the hardness of the others. It would also account for the more paraffinoid nature of the cannel coal oils and the more phenolic character of the easily fractured coking coals.

Coking Process.

They were now in a position to consider the nature of the coking process. At this point the lecturer directed attention to an illustration which he had prepared. It was a piece of coal lying on the sole of a horizontal retort, coloured to show the process of carbonization. The outer shell of the piece of coal might be 700° or 800° C., while the centre might be only at 200° or 300° C. In the M'Laurin process (owing to the longer time taken in carbonization), while the temperature outside might be 400° C., the inside temperature would probably not be less than 350° C. The piece in the horizontal retort quickly got fused on the surface by the resins on the surface melting. While this was happening, light oils and gas were being rapidly driven out from the centre. Naturally the coke was blown-up into a series of bubbles, and at the finish was a rather friable mass, unless the heat was raised sufficiently at the end to change the amorphous carbon into graphite, when apparently an incipient fusion took place, which finally hardened into coke. In semi-low temperature processes, this of course never took place. In the M'Laurin process, the heating of the coal was so slow and so uniform that the bulk of the lighter oils and gas were away before the softening of the resin began; and this again was so slow that it practically softened and hardened again *in situ* as it were. It was in this way that he accounted for the greater hardness of the high-temperature coke produced in his process. If the temperature was finally raised until the amorphous carbon was altered, then a very hard coke was obtained.

[Samples of both cokes were displayed on the tables.]

DISCUSSION.

Mr. A. WADDELL expressed his appreciation of the lecture, which had been most interesting to them all, although Mr. M'Laurin was now distilling at temperatures considerably lower than they were used

to, and the results were therefore not worth so much to them as gas-makers. There was, he believed, no difference in principle in the way they got gas from coal to-day and the way they got it long ago. He was satisfied that the gases from the middle of a piece of coal were destroyed, as Mr. M'Laurin had indicated, in getting them out. This could not be helped. But if they were going to make gas, there was still the possibility of at least keeping these gases from being further destroyed in their discharge through the retort. Mr. M'Laurin had shown them how he got different products by using a lower temperature than others were using; and he (Mr. Waddell) understood that the lecturer hoped to get materials which would be much more valuable than were obtained in mid-temperature carbonization. It would be very satisfactory if they could all get these things as well as those which they were at present getting. This might be done if they had a method of taking the gases evolved at low temperatures at the top out into a separate holder and those produced at the higher temperature into another vessel.

The PRESIDENT asked how Mr. M'Laurin regarded low-temperature carbonization from a commercial point of view, seeing that the future of carbonization depended upon the value of the products. Looking into the future, Mr. Waddell pictured the time when they could lay hold upon both the high and the low temperature products. He (the speaker) thought this was a moot point in regard to vertical retorts. Mr. M'Laurin's remark, that most of the gases passed up the side of the retort, was debateable; for others maintained that they found their way through the coal.

Mr. M'LAURIN, in reply, said that if they were dealing with a non-coking coal, the gas would travel up through the coal; but if the coal had a lot of resin in it, it certainly would not. With regard to Mr. Waddell's remarks, if they were going to get the products referred to, they could only be obtained by distillation. The amount of illuminant in ordinary gas was very small; and it might be possible to get gas while only distilling a very small part of their oils. It was purely a commercial question. If the oils he was getting were too valuable to destroy, then they must be recovered. As to the relative value of the paraffins and benzenes, it was very difficult to say, because the paraffins had realized as much as 6d. per lb. The coal-tar trade was one of the most fluctuating. At the present moment, from the gas-making side, he could not see much hope of the low-temperature system; but on the semi-side, it was very much different. Semi-low temperatures might interest gas engineers; but low temperatures would not interest them meantime. The value of some of the dyes he had referred to was such as to warrant him going on and endeavouring to develop them. Some other products were worth several shillings per gallon; and many of the varnish stains were selling at 10s. to 12s. per gallon.

On the motion of the PRESIDENT, Mr. M'Laurin was cordially thanked for his interesting lecture.

Small Consumers Highly Profitable.

In a paper which he read before the Michigan Gas Association, Mr. P. M. Spanogle remarked that it behoves gas companies to vigorously devote their energies towards the goal of higher efficiencies—especially since it has been necessary to increase industrial gas rates, along with calorific value reductions. This need is further emphasized by the fact that excessive war-period demands upon the gas companies have not, as was anticipated, noticeably decreased, whereas the manufacturing requirements continue to increase, thereby taxing the gas companies' producing and distributing facilities to a limit not expandable except by incurring large expenditure. At the present time, financial interests apparently hesitate to support investment for extension work of this nature—probably because the narrow margins of profit from gas sales through increased cost of production, distribution, &c., have materially reduced the earning power of the dollar. It is therefore incumbent upon every gas company, not only to guard the present earning-power of the dollar, but to find ways and means of increasing it. This may be accomplished, without further investment, by continuing to meet the present gas demands of the larger consumers to the full capacity of the existing distribution systems supplying them, while at the same time developing additional high-rate business among the smaller industrial consumers on such of the distribution mains as are not already up to capacity. During the last few years proper attention has not been given to these small consumers, who are just as anxious as the larger ones for more efficient methods, and are equally entitled to them.

German Nitrate Plants.—In the course of an address on the "Rhineland Chemical Works," at the opening meeting of the Manchester Section of the Society of Chemical Industry, Mr. John Allan (the Chairman of the Section), who has recently visited a number of the works in the occupied area of Germany, said that the plants at Oppau and Merseburg, in which the direct synthesis of ammonia from atmospheric nitrogen and hydrogen was carried out, were enormous in their dimensions, and were a monument to the skill of the chemists and the engineers who erected them. Similar words might be applied to the plants at Höchst and Leverkusen, in which ammonia was oxidized to nitric acid. The imposing sight of the building at Höchst, which housed 256 platinum catalyst vessels, with their various connections, was one which a chemist could not easily forget. The capacity of this particular plant was 8000 tons of nitric acid of 100 p.ct. strength per month; so that approximately a ton of nitric acid was produced by each catalyst vessel per day. The whole installation was an outstanding example of the mass production policy which had been so largely adopted by the German chemical firms as a means towards reducing production costs.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Retort-Charging.

SIR,—I note in your issue of the 7th inst. that Mr. C. E. Wright, of Ipswich, states in his paper that he is "hoping to hear of a successful retort-charging device . . . projecting coal into the retort purely by the velocity of its fall."

Mr. Wright will, I am sure, be interested to hear that such a device was tried in one of the Paris Gas-Works in 1904, and was, I believe, abandoned after being in use some little time. This was evidently a modification of the De Brouwer patent, which had been introduced shortly before.

Though I have no actual knowledge as to why the scheme was abandoned, I should think it was chiefy due to the use of varying classes of coal.

W. B. LEECH, Engineer.

Gas Light and Coke Company,
Beckton, Oct. 11, 1919.

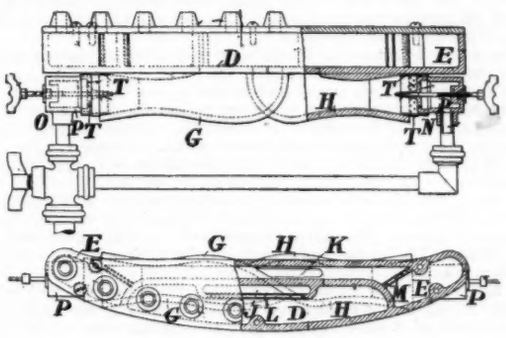
REGISTER OF PATENTS.

Burners for Gas-Fires.—No. 131,614.

M'LUSKY, W. B., of Halifax.

No. 15,063; April 16, 1918.

This invention consists in a duplex gas-burner wherein fuel is supplied to each mixing tube by means of a carburettor provided with a set of fuel openings of constant area and an independent opening of variable area—the jet of fuel from the constant set of openings, with or without the jet from the variable opening, entering the mouth of the mixing tube, and drawing in and mixing with a supply of air; the resulting mixture being directed to the nozzle chambers through the mixing tube, which is constructed as a Venturi tube.



M'Lusky's Adjustable Gas-Fire Burner.

A front elevation and a plan view (both partly in section) are given.

When constructing the burner for use with an open fire-grate, it comprises a casing (projecting from the top face of which are a number of nozzles) internally fitted with a partition by which its interior is divided into two separate compartments D E. These serve as supply chambers to the nozzles, which are thus divided into two groups—one group consisting of a pair of nozzles at each side supplied from the chamber E; while the other group consists of a number of front burner nozzles (six in the example shown), supplied from the chamber D. Beneath the casing are a pair of mixing tubes G H, which extend outwardly from about the centre, with their inner ends communicating with portions J K of the chambers, which are supplied with gauze screens or other filtering or anti-firing-back members L M.

The gaseous mixture enters the chambers at about their centre portion, so that a uniform distribution of gas to the nozzles is obtained. Towards their inner ends the mixing tubes are rounded, to afford easy flow to the gas mixture; while their outer ends are of flared or conical form to accommodate the carburettor N O. The gas passes into the mixing tubes through perforations in the front wall of the casing P, and is there mixed with air drawn through an annular screen T, of bit-and-miss construction. By means of the perforations a constant supply of fuel passes into the injector, and is there mixed with the proper supply of air to ensure the required richness of mixture to produce the necessary heat at the burners; the bit-and-miss arrangement being adjusted until the desired quality of mixture is obtained, so that, under normal conditions, a mixture of constant strength is ensured to feed the burners.

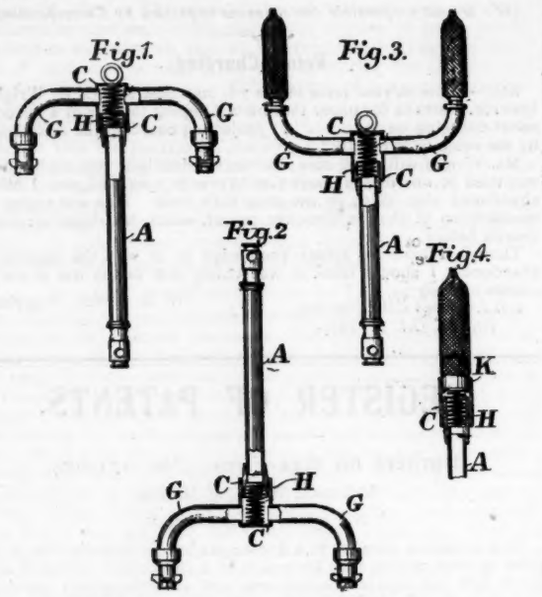
Anti-Vibrating Devices for Street Incandescent Gas Lights.—No. 132,175.

WILDBORE, J. E., of Oldham.

No. 4451; Feb. 22, 1919.

An anti-vibrating device constructed according to this invention comprises a gas-and-air inlet-pipe which has at its outlet end a tubular socket with internally a seat and a tubular part carrying the burner head, with one end (closed or open) forming a socket for a burner head and the other loosely fitting around the exterior of the tubular socket,

A coiled spring is fitted inside the tubular socket and tubular part, one end of which bears against the seat and the other end against the closed end of the tubular part.



Wildbore's Anti-Vibration Gas-Lamp Fitting.

In fig. 1 is illustrated the device with inverted mantle holder. In this instance the supply tube A and tubular part C point upwards; while the arms G are bent down and adapted to receive a mantle holder. The outlet end of the supply tube forms a socket H, around which the tubular head is adapted to slide loosely. The socket internally supports a coiled spring.

Fig. 2 also illustrates a device with two inverted mantle holders. Here the outlet end H of the supply tube and the ends of the arms G point downwards; the upper end of the spring being secured to the socket, and the lower end to the closed end of the tubular part C.

Fig. 3 shows the device with two upright mantle holders. In this example, the supply tube A and tubular part C are located as in fig. 1; but the ends of the arms G are bent upwards to carry upright mantle holders.

In fig. 4, which illustrates an anti-vibrating device with a single upright mantle holder, the tubular part C is placed on the upper end of the supply tube A. The arms thereon are, however, dispensed with, and the part C is formed open as a tubular socket K containing the burner head carrying the mantle holder.

In figs. 1 and 3 the top of the part C is shown formed with a hook or eye for suspending it so as to permit of cleaning the supply tube and (in case of street-lamps) to give the cleaner free access to the lamps.

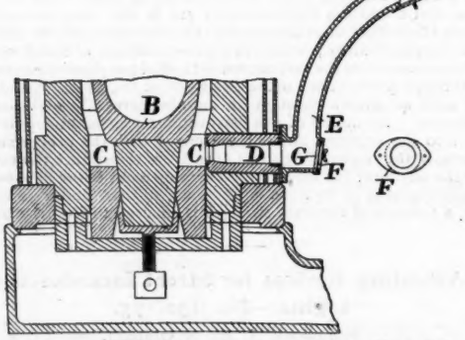
Gas-Heated Crucible Furnaces.—No. 132,398.

SOUTH METROPOLITAN GAS COMPANY and CHANDLER, D., of Old Kent Road, S.E.

No. 18,983; Nov. 19, 1918.

The object of this invention is to provide for the escape of the molten metal should the pot break before it has time to become set or any appreciable harm has been done in the furnace.

There is fitted at the back of the pipe which leads the combustible mixture of air and gas into the furnace a plate of easily fusible metal.



Chandler's (South Metropolitan Gas Company) Gas-Heated Crucible Furnace.

So long as the furnace remains properly in action, the plate is intact. If, however, the melting pot breaks, the molten metal finds its way into the burner tube and melts the plate. An escape for the metal is thus at once provided, and it runs out in a sand bed on which the furnace is placed, instead of remaining in the furnace and becoming set. The burner is inserted at an inclination into the lower part of the furnace, so that the molten metal from a broken crucible will readily find its way out.

This arrangement, it is said, in no way prejudices the working of the furnace in normal circumstances; and, should a breakage occur, the fusible plate is easily replaced, and there is little or no damage to set right in the furnace beyond the substitution of another crucible, which is inevitable.

In the sectional side elevation of the furnace shown B is the crucible surrounded by a space C. D is the burner connected to the tube E. In the latter, at the back of the burner, is the plate of fusible metal F, which closes the orifice G in the tube E, through which, should the crucible break, the metal will run out before there is time for it to cool and set.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Oct. 8.]

Nos. 23,814—24,291.

AINSWORTH, F.—"Combined gas fire-lighter and heating unit." No. 24,065.
ALLAN, A.—"Apparatus for indicating pressures at a distance." No. 24,107.
BEARD, G. F. H.—"Hydraulic mains for gas-retorts." No. 24,171.
BOOTH, J. H.—"Valve-operating mechanism." No. 24,158.
BOOTH & Co., S.—"Cocks or taps." No. 24,142.
BRIERLEY, LTD., W.—"Gas-stoves." No. 24,059.
CHADWICK, V. R.—"Waste-gas furnaces." No. 23,870.
CONSTANTARAS, A.—"Generation of combustible gas for lighting, heating, power, &c." No. 23,963.
DAVIDSON, H. J.—"Apparatus for indicating pressures at a distance." No. 24,107.
DEMPSTER, R. & J.—See Beard. No. 24,171.
FYFFE, T. L.—"Pipe-joints, &c." No. 23,961.
HANDS, G., AND HANDS & Co., G.—"Detachable anti-vibrator for inverted burners." No. 24,073.
HELPS, G.—"Bunsen burners." No. 24,041.
JONES, R.—"Gas-stoves." No. 24,059.
KING, F.—"Apparatus for automatically controlling illuminating gas, &c." No. 23,839.
KOOLHOVEN, F.—See Davidson. No. 24,107.
RAYBOULD, A.—See Hands. No. 24,073.
SOUTH METROPOLITAN GAS COMPANY.—"Glass blowing." No. 24,196.
SUTHERLAND, LTD., A. G.—See King. No. 23,839.
TOOLEY, G. W.—See Beard. No. 24,171.
WEBSTER, F. A.—See Booth & Co. No. 24,142.
WILLIAMS, A. & L. D.—"Determining composition of gases." No. 24,005.

Stove and Meter Rents at Stockport.

Alderman Welsh, in moving the adoption of the minutes of the Gas Committee at the monthly meeting of the Stockport Town Council, referred to the increase of 100 p.ct. in the existing stove-hiring rates, and to the charge for meter-rents varying from 1s. per quarter for 2 to 5 light meters, to £2 15s. for 600-light meters. The cost of maintenance of stoves and meters had, he said, increased to such an extent that the Committee felt it was only right for consumers to bear a portion of the expense. The position at the end of June showed a serious deficit on the undertaking; and this had to be met. The amount received from the new scale would be approximately £10,000 a year. The Committee had had under consideration the provision of further carbonizing plant, and had now decided to instal Woodall-Duckham retorts. Alderman Sharples, alluding to the financial results of the undertaking, said they ought to have a report from the Gas Committee as to the cost of production of gas, and the cause of such cost. Mr. Lomas remarked that only when they had their new plant going could they compare with neighbouring towns. He considered that the Gas Committee were taking the right step in making everybody pay for that which they received. It was only tantamount to putting up the price of gas. Alderman Welsh, in reply, said that at present a quarterly statement as to the result of the working of the gas undertaking was supplied to the Finance Committee; and this, he thought, ought to be sufficient. The Committee were reducing the capital debt at the rate of £11,000 a year, which came out of the revenue of the department.

Kendal Gas-Works Accounts.—The Auditor's report on the accounts of the Kendal Corporation states that for the year ended March 31 the gas-works yielded a profit of £1128. After adding the amount brought forward from the previous year and transferring £125 to the renewals fund, a credit balance of £1375 was carried forward. The reserve fund of £5000 still remains intact.

Leamington Priors Gas Company.—The payment of the usual dividends was agreed to at the meeting of the Leamington Priors Gas Company; the Chairman (Dr. Thursfield, J.P.) remarking that, to enable this to be done, the "carry forward" was further reduced by £1561, making a reduction of over £4000 in the reserves during the twelve months' working. This fact, coupled with the increased expenditure on wages, coal, and other materials which had to be met, amply justified the 4d. increase in the price of gas which had been decided on. The half year dealt with in the accounts had been one of considerable anxiety and of rising costs; but the new price of 3s. 9d. per 1000 c.ft. for gas would be an advance of only 50 p.ct. on the pre-war charge. He did not know of any other commodity which had advanced so little; and as for gas, there were very few towns in the Midlands where the price was now as low of 3s. 9d. Considerable expenditure had to be incurred on new mains, and on a sulphate of ammonia plant. The wages paid for the year ended June 30 last were nearly double what was paid in 1914.

MISCELLANEOUS NEWS.

SUNDERLAND CORPORATION AND THE GAS-WORKS.

Purchase Bill to be Promoted.

The recommendation of a Special Committee of the Sunderland Corporation, that no steps be taken to purchase the Gas Company's undertaking, was not accepted by the Town Council last Wednesday. Instead, the Council adopted an amendment moved by Mr. Frank Nicholson (the Chairman of the Finance Committee), that a Bill be promoted in Parliament for the acquisition of the undertaking, and that the whole question be fully investigated, and the decision of the Council for or against purchase be made at a special meeting of the Council to be held in committee.

Mr. Nicholson said he did not move this because he was in favour of the Corporation taking over the gas supply—as to which he had an open mind—but simply to give time for the Council to go fully into the matter and arrive at a considered decision; so that in after-years people would not be able to say the Council had been in a hurry to protect the capitalist interest by determining, without any investigation, against purchase. There was a very considerable body of opinion which held that such a public service as a gas supply ought to be publicly owned; and they did not want to give people with these views any ground for saying that the Council had decided the matter without adequate consideration. At present the Company was one of the best managed undertakings in the country; and from what he knew of conditions during the war, he did not think that, if it had been owned by the Corporation, it would have been nearly so successful during this period as it had proved under private ownership.

Before the Council decided in favour of Mr. Nicholson's policy, a deputation was heard from the local Trades and Labour Council, advocating purchase of the undertaking.

AUSTRALIAN GAS LIGHT COMPANY'S MEETING.

The Annual General Meeting of the Company, which took place at the Royal Exchange, Sydney, on Aug. 11, was presided over by Mr. GEORGE J. COHEN (the Chairman), who moved the adoption of the report for the past half year, and the payment of a dividend of 4 p.ct.

In doing so, he said the disabilities which had arisen out of war-time conditions were, in the main, still with them; but it was hoped that they were now on the eve of a return to something approaching normal conditions. Capital having been obtained through the issue of new shares, the Board had been enabled to sanction further extensions of the mains to meet the demand for gas; and special consideration had been given to applications from returned soldiers. Unfortunately, the difficulty of obtaining gas-meters still existed; and it had been found necessary to devise a flat-rate system of supply, for operation pending the receipt of additional meters. The basis of charge was arrived at in collaboration with the representatives of the Department of Labour and Industry. The Board had also decided upon large extensions at the Mortlake works, including new coal and coke wharves, and the reconstruction of the No. 1 retort-house. The operations of the Company continued to extend; the increase in consumption of gas being 4·1 p.ct. over the corresponding period of last year. The consumers showed a net increase of 2149—making a total of 147,643. The Federal Government sanctioned an increase of 2s. 9d. per ton on coal supplied from May 5. This, together with an increase in the price of oil (also by Federal Authority), had meant heavily increased production costs, which fully justified an immediate substantial increase in the price of gas. The Board, however, bearing in mind the serious public anxiety and inconvenience created by the influenza epidemic and the shipping strike, deferred any increase in the price of gas till the last possible moment. An increase by 4d. to 4s. 8d. per 1000 c.ft. would come into operation on Aug. 15. The Commonwealth was maintaining its reputation with regard to strikes, the latest being in connection with seamen. This had very seriously interfered with the Company's supply of coal. Fortunately, the Company had been able to arrange for supplies to come by rail, though at a very much enhanced cost for freight. A regular gas supply had been maintained, though at one time it was feared that the Gas Emergency Board, which had been reconstituted, would have had to bring in restrictions on the lines of those in force during the 1917 coal strike. It had always been the endeavour of the Company to accumulate big reserves of coal; and at the beginning of this year the stock amounted to 60,000 tons—equal to three months' supply. This was probably an unusually large quantity for any similar undertaking to hold in reserve, and, of course, placed the Company in a very favourable position.

The report was adopted; and the meeting confirmed a resolution increasing the maximum number of shares to be held by any one person to 5000. The previous limit was 4000 shares.

BRADFORD CORPORATION GAS DEPARTMENT.

Gas Engineer's Report.

Mr. Charles Wood, the Engineer and Manager of the Bradford Corporation gas undertaking, has presented to the Gas Committee his report on the working of the department for the year ended March 31 last, and during the period of the war.

He says that coal was, and is, the main cause of anxiety. Gas undertakings are still in the hands of the Coal Controller, so far as coal supplies are concerned. Throughout the year the Controller obliged the Committee to take a percentage of Durham coal in lieu of best Yorkshire. While any coal is better than none (and latterly gas undertakings have had to take what they could get), it is nevertheless regrettable that the Coal Controller should deem this substitution to be necessary, because not only is Durham coal less suitable for vertical retorts, but the greater cost of carriage (about 6s. per ton) falls upon the department. Mr. Wood has made strong representations to the Controller from time to time, not without success; but in the main the position has been far from satisfactory.

During the year under review, the gas sold (including 44,784,000 c.ft. used in public lamps) amounted to 1,781,584,000 c.ft., being a decrease of 1·76 p.ct. The following table shows the quantities of gas sold—with the increase or decrease compared with the previous year's output—for the years ended March 31, 1914 to 1919:

	Thousands.	Increase or Decrease Per Cent.
1914	2,100,495	1·72 increase
1915	2,043,661	2·70 decrease
1916	1,808,980	11·48 ,,
1917	1,833,171	1·33 increase
1918	1,813,618	1·06 decrease
1919	1,781,584	1·76 ,,

The Household Fuel and Lighting Order, 1918, came into operation in Bradford on Oct. 1, 1918. Gas consumers appeared immediately to exercise strict economy in the use of gas—so much so that for the first month the output suffered a decrease, compared with the figure for the corresponding month of the previous year, of 5·76 p.ct. For November, the drop was 5·95 p.ct.; for December, 9·36 p.ct.; and for January, 1919, 6·30 p.ct. During February—possibly in anticipation of a modification of the Order—the position came nearer to normal; and for that month the output recorded was 1·98 p.ct. greater than in February, 1918. March showed an increase of 2·18 p.ct. So far as coke was concerned, the Order created an increased demand; and stocks were swiftly disposed of.

In 1914, over 13,000 street-lamps were in operation in the city. The number now lighted is 7700. As to the contribution of the Finance and General Purposes Committee towards the cost of public lighting, the sum received this year is only £18,500. The actual cost of carrying on the restricted lighting during the year was £18,995 (£495 more than the Finance Committee's contribution); but, in addition to this, the Gas Committee, on the basis agreed upon by the principal gas companies and corporations, should have been paid at least £18,000 for the maintenance of plant used for street lighting, which plant has to be maintained irrespective of the number of lamps lighted.

In July, 1918, the price of gas was advanced from 2s. 11d. to 3s. 4d. per 1000 c.ft., and in January, 1919, from 3s. 4d. to 4s. Coke and other residuals realized better prices; otherwise the price of gas would have had to be raised to a much higher figure.

From August, 1914, onwards the Department had large stocks of coke on hand, owing principally to the cessation of the export trade to the Continent. The turn came in 1915, since when the demand has been very great—frequently much greater than the supply. The present position is that coke is sold almost as fast as it is produced, and, whereas before the war many thousands of tons annually were sold outside, practically all coke produced is disposed of within the city.

At the outbreak of war the foundations of the installation of Woodall-Duckham vertical retorts at the Birkshall works were nearing completion. Fortunately, a considerable quantity of steel work and other materials had then been delivered; but owing to the Contractors continually losing men, who left to work on munitions, the erection of the plant became more and more difficult. Eventually, the importance from the national standpoint of this and similar plants being realized, the Birkshall installation received Government benediction. The first half was completed and put into operation in November, 1917; and the second half was taken over by the Mineral Oil Production Department of the Ministry of Munitions, under arrangement with the Committee, and used for the production of oil fuel for the Navy, on Oct. 8, 1918. Cannel coal was provided by the Ministry, and the surplus gas sold to the Corporation. This arrangement terminated in January, 1919; and the oil-production plant erected by the Ministry of Munitions was ultimately purchased by the Gas Department for the sum of £8950. It has since been continuously in use for ordinary gas production. The Glover-West vertical retorts at Thornton Road have been working since 1912. Both the Woodall-Duckham plant at the Birkshall works and the Glover-West installation at Thornton Road are proving highly successful.

The disastrous explosion at the works of the Low Moor Chemical Company, Ltd., on Aug. 21, 1916, resulted in the partial wrecking of the Low Moor Gas-Works. Both holders were seriously damaged; and the various buildings on the works were all more or less injured. The larger holder was ready for use again in November, 1916, and repairs to the smaller one were completed in May, 1917. Gasmaking was resumed on Nov. 27, 1916. The whole cost of the damage was covered by insurance.

At the termination of hostilities, 261 men had enlisted in His Majesty's forces. Of this number 29 made the supreme sacrifice, 66 were wounded, 11 taken prisoners, 6 gained honours for gallantry or meritorious service, and 3 attained commissioned rank. Since the beginning of the war, £25,733 has been paid in allowances to soldiers' dependants.

In 1916, at the instigation of the Ministry of Munitions, a plant was constructed (at the expense of the Ministry) at the Valley Road works for the extraction of benzol and toluol. This plant began working in October, 1916; and from that date to March 31, 1919, 587,949 gallons of benzol were produced. At the cessation of hostilities negotiations were entered into; and the plant was ultimately purchased from the Ministry on very advantageous terms to the Department. Benzol is now being produced at Valley Road for commercial use. It is estimated that, from beginning to end, the Bradford Gas Department has produced sufficient toluol and other ingredients to provide the high explosive for more than four million 18-pounder shells. The Bradford gas undertaking held the record for toluol production among the large gas-works of the country.

The financial result of the year's trading was a net profit of £670. For the preceding year (April, 1917, to March, 1918) there was a loss of £31,710. The gross or trading profit amounted to £55,424, being

£28,076 more than for the previous year. Interest on loans accounted for £32,554—an increase of £1048. Income-tax was £5704 less; and the sinking fund contribution of £17,816 shows an increase of £352. A substantial decrease in carbonizing wages (in spite of the increased rates of wages and war bonus) is accounted for partly by the reduced gas consumption, but chiefly by the economies effected by the vertical retorts at the Birkshall works.

In view of the many exceptional circumstances, Mr. Wood feels sure that the Committee and the Council have no cause to be other than well satisfied with the year's work. The supply of gas to the city has been maintained throughout the year, notwithstanding erratic and reduced coal supplies, labour difficulties, shortage of materials, and inadequate renewals of plant and mains. For the first three months of the year April, 1918, to March, 1919, the price of gas had only risen 40 p.ct. above the figure of 1914; during the following six months 60 p.ct.; and for the last three months of the financial year 92 p.ct. Therefore the price of gas in Bradford has not by any means kept pace with the generally increased cost of labour and materials.

WIGAN GAS-WORKS.

Mr. H. Farr, the Chairman of the Gas Committee, in moving the confirmation of the Committee's minutes at the October meeting of the Wigan Borough Council, said that they had now received the official communication from the Ministry of Health approving of their application to raise the price of gas. He understood that there was to be some organized opposition from District Councils in the neighbourhood; but this opposition either had not been successful or had never materialized. Mr. Alstead stated that, at the previous meeting of the Council, he had asked the Chairman of the Committee how he justified the prices of gas and coke being three times what they were in 1914. He had said that the only justification there could be was that they should be paying at least three times as much on capital charges, and three times as much for fuel and raw materials, labour, and general expenses. By the kindness of the Chairman, he now had figures prepared by the Manager which put a different complexion on the position. He found it was not a fair statement of the case to take gas used for manufacturing purposes and charged to the consumer in 1914 at 1s. 8d. per 1000 c.ft., as this was not the average price. The average price of gas before the war worked out at 2s. 10d. gross, and 2s. 6½d. net per 1000 c.ft., and to-day's price was 5s. 1½d.; so that it had doubled. Mr. Bamford suggested that, if the vertical-retort system was going to be held-up any length of time, the Manager should give the Committee information as to whether he could get 13,000 c.ft. per ton in his present plant by adopting steaming. The minutes having been adopted, Alderman Baucher moved that the Borough Treasurer be instructed to prepare a detailed financial report relating to the gas undertaking—"showing, in particular, the trading of the department during the period from April 1, 1909, to March 31, 1919, the fluctuation which during this period has from time to time taken place in the cost of materials, labour, and standing charges, and the prices realized for gas, coke, and other residuals, and generally such a report as will enable the Council to know the true financial position of the undertaking." After a lengthy and extremely heated discussion, the Council agreed to the notice being referred to the Gas Committee.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 13.

The shipment of pitch is only limited by the availability of steamers and sailing ships. Makers are well supplied with orders; while there are still large inquiries from the Continent. The price is quite strong, and business is reported at over 80s. net per ton f.o.b. makers' works. Creosote is also in a healthy position; and the minimum price is 6d. net per gallon. Motor benzol is taken delivery of as quickly as manufactured. Pure benzol and pure toluol are each about 2s. 9d. net per gallon, packages extra. There is considerable inquiry for high-grade anthracene; but supplies are very limited.

Large quantities of sulphate of ammonia continue to be sold for the home agricultural trade.

Tar Products in the Provinces.

Oct. 13.

The average values for gas-works products during the week were: Gas-works coal tar, 37s. 6d. to 42s. 6d. Pitch, East Coast, 70s. to 72s. 6d. per ton f.a.s.; West Coast—Manchester, 60s. to 62s. 6d.; Liverpool, 60s. to 62s. 6d., Clyde, 70s. to 72s. 6d. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.ct. at 120° C., 11½d. to 1s. 0½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 2s. 3d. to 2s. 4d. Heavy naphtha, North, 2s. 1d. to 2s. 3d. Creosote, in bulk, North, liquid, 5d. to 5½d.; salty, 4½d. to 4¾d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., 1s. 6d. to 1s. 6½d. Naphthalene, £15 to £17 10s.; salts, £4 10s. to £6, bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality nominal.

Manchester District Tar Prices.

The average price realized for tar in the Manchester district, based on the value of the products, for the month of August was £2 12s. 1·5d. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

Definite prices are difficult to obtain; markets not yet having recovered from the dislocation caused by the railway strike. Pitch,

USE Simmance's

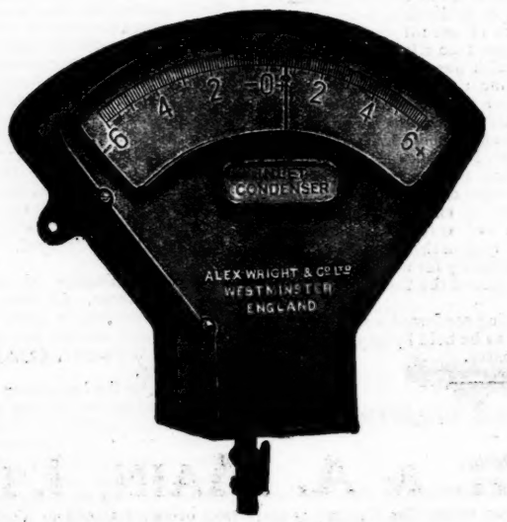
DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.



Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

however, remains very firm. Shipments were, of course, held-up during the strike; and it will be some time before conditions become normal. But inquiries are plentiful; and, given freedom from interference, prospects of higher prices are good. There is no visible change in carbolic acid, and it has been impossible to test values of late. Creosote remains unchanged; but benzol has become scarce. There is no real change in the position at the moment; but the impetus given to road transport should prove advantageous, and may shortly lead to an advance in quotations. Naphthalenes remain about the same. The scarcity of solvent naphtha has continued, especially in provincial centres. Difficulty has been experienced in obtaining supplies as the result of transport troubles. The position has slightly improved at the time of writing.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 9½d. North; crude, 60-65% 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Carbolic Acid: Crude 60's 1s. 8d. per gallon nominal; crystals, 40%, 7½d. per lb. asked.

Crude Tar: London, 47s. to 50s.; Midlands, 44s. to 46s.; North, 44s. 6d. per ton *ex* works.

Pitch: London, 80s. to 85s. per ton; East Coast, 70s. to 75s. per ton; West Coast, 67s. 6d. to 72s. 6d., with Manchester 70s. per ton and Glasgow 72s. per ton; South Wales, 64s. to 68s. per ton.

Solvent Naphtha: London, 2s. 6d. Provinces average 2s. 5d. per gallon.

Crude Naphtha: Naked, 9d. per gallon.

Heavy Naphtha: 2s. 5d. per gallon.

Naphthalene: Refined, £16 to £18 per ton nominal; crude, £5 10s. to £11, according to quality.

Toluol: Naked, 2s. 6d. per gallon nominal. North, 2s. 5d.

Creosote: London, 7½d.; North, 5⅜d. to 6½d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 7d. to 7½d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95%, 2s. 4d. to 2s. 5d.; 97-99%, 2s. 7d. to 2s. 8d. *ex* works London, f.o.b. other ports.

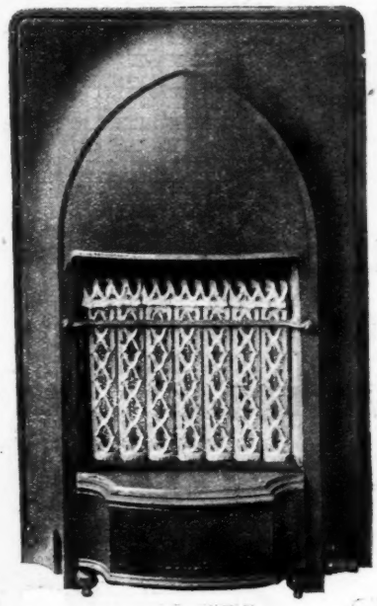
Sulphate of Ammonia.

There is no change in the position. Trade is of small proportions, and deliveries are considerably in arrear. Prices are now fixed until May of next year; and the export prices are given as nominally round £25. Very little export trade, however, is being done. Reports from America show that production is still growing; and the demand for export is heavy. Spain is now purchasing her requirements of sulphate in this market; while before the war English makers have always attended to her needs. On the Pacific Coast—an important market for sulphate—prices are lower, in sympathy with nitrate of soda; but a further fall is regarded as doubtful.

Gas Coal Stocks in Ireland.—The railway strike did not extend to the Irish lines. But its effects were quickly felt all over Ireland; and the Coal Controller there (Mr. H. G. Burgess) took immediate steps to prevent further coal shortage and to ensure economy in available supplies. Mr. George Airth (of Dundalk), Hon. Secretary for Ireland of the National Gas Council, was informed by the Council that coal supplies were ceasing everywhere, and that gas companies must exercise the utmost economy. An intimation to this effect was at once conveyed to the undertakings by Mr. Airth, who stated that, with the possible exceptions of Dublin and Belfast, the gas-works in Ireland were at present in a worse state as regarded coal than they had been since the outbreak of the war. Many of them, it was calculated, had not stock to last for more than fourteen days, if as long. The companies were advised to reduce pressure to the lowest point during the day, and, where possible, to cut off the supply after certain hours at night.

Municipalization Question at Sheffield.—There has been some correspondence in the local Press, discussing the advisability of the Sheffield Corporation taking steps to acquire the works of the Gas Company. One of the writers, Mr. R. H. Smith, says that the City Council are committed to quite sufficient financial obligations, without absorbing what has always been a well-managed Company; and he expresses the opinion that the people will never have cheap gas again, if the Corporation get hold of the works. He proceeds: "The electrical department has never helped the rates of the town; and to extend municipal trading by acquiring the gas would only mean more expensive officials, and an additional burden upon our ever-growing expenditure. Sheffield, prior to the war, had, with one exception, the cheapest gas in the United Kingdom. The Gas Company has been a bugbear to the electrical department; and if the works are acquired by the Corporation all healthy competition will be done away with. This great city of ours has not been built-up by municipal trading, but by private enterprise."

Price of Gas at Plymouth.—The Plymouth and Stonehouse Gas Company have notified consumers of an increase of 6d. per 1000 c.ft. in the price of gas, making it 3s. 4d. for lighting, heating, and cooking, and 3s. 1d. for engine consumption. In a circular the Secretary (Mr. G. H. Bolton) says that, in spite of this increase, the price is still among the lowest in the country. Coal has recently advanced by 6s. per ton, and freights have increased no less than 17s.; while the cost of other materials and labour has also advanced. As Sir Auckland Geddes foreshadowed an increase of 6d. to 9d. per 1000 c.ft. as the result of the advance in the price of coal, quite independent of the increased cost of freight, the Company consider it fortunate that they are able to limit their charges to the figure now announced. Consumers are, however, also informed that, in consequence of the increased cost of labour and materials required for the maintenance and repair of meters, cookers, fires, and other apparatus let on hire, the rental charges for these appliances will be increased by from 50 to 100 p.ct. The opportunity is offered the consumers of purchasing the cookers and other appliances (except meters) which they have on hire.



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THE new "Gothic" Gas Fires are now ready—also many other new designs. Every "Main" Fire will give daily dividends of comfort to your consumers. Don't allow the old type wasteful Gas Fires to continue in use. Replace them with "Mains," so making the most of your output and adding satisfied customers to your list for the good times ahead.

What quantity of New "Main" Lists may we send you?

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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 6, Narrow Wine Street, BRISTOL; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE.

Worthing Gas Company and the Sliding-Scale.

The Worthing Gas Company having given notice of their intention to apply to the Board of Trade for an Order under the Statutory Undertakings (Temporary Increase of Charges) Act, the Town Clerk reported, at a meeting of the General Purposes Committee of the Corporation, that, with gas at 5s. 8d. per 1000 c.ft., the dividend of the Company under the existing statutory requirements must not exceed 2½ p.ct., against the 3¾ p.ct. suggested by the Company and contemplated by the Act. The Committee decided to recommend the Council to make representations to the Board of Trade objecting to the proposal of the Company to stabilize the dividend at 3¾ p.ct., unless provision be made for the sliding-scale to come into operation in the event of any further increase in the price of gas beyond 5s. 8d. per 1000 c.ft., providing for a reduction of dividend of 2s. 6d. p.ct. for every increase of 1d. per 1000 c.ft. beyond 5s. 8d.; or, alternatively, that the standard price be increased from 4s. to 4s. 10d., and the present standard rate of dividend 5 p.ct. remain unaltered, and the sliding-scale remain in operation. This would have the effect of reducing the dividend automatioally to 3¾ p.ct.; and if the price were hereafter raised above 5s. 8d., a reduction of 2s. 6d. p.ct. in the dividend would take place for every increase of 1d. in price, or an increase of 2s. 6d. p.ct. in the dividend for every 1d. reduction in price below 5s. 8d.

Sheffield Corporation and the Gas Undertaking.—The Parliamentary Committee of the Sheffield Corporation have had submitted to them by the Town Clerk reports with reference to the possibility of acquiring the undertaking of the Sheffield Gas Company, and as to the condition of the Company's plant and finances. It was arranged to refer the matter to a Sub-Committee, with power to enter into negotiations with the Company.

Gas Consumption in Carlisle.—In his report to the Carlisle Gas Committee on the working during the year ended March 31 last (some particulars from which were given in the "JOURNAL" for Sept. 16, p. 631), Mr. J. E. Blundell, the Engineer and Manager, said that there had been a decrease of 2·7 per cent. in the make of gas, and of 4·3 p.ct. in the total quantity sold. The yield of gas per ton of coal carbonized was 11,410 c.ft., as compared with 10,953 c.ft. in 1917-18. The average consumption last year per ordinary meter was 43,590 c.ft., and of prepayment meters 15,790 c.ft.

A Threatened Gas Price Strike.—At Tanfield the local Miners' Lodge are protesting against the price of 6s. 7d. per 1000 c.ft. for gas. They state that, in the event of their being unable to obtain a reduction, they will institute a house-to-house canvass, with a view to ascertain how many persons are prepared to dispense with the use of gas until a more satisfactory arrangement is arrived at. Mr. Charlton told the Council that people were prepared to go on strike because of the excessive prices. Some had refused to pay, and their gas had been cut off. This was "direct action." The Council appointed a deputation to wait upon the Tanfield Lea Gas Company.

Quality of the Gas at Padiham.—The Chairman of the Padiham Urban District Council, referring to complaints about the quality of gas, remarked that Padiham gas used to be of 600 B.Th.U.; and to-day it was from 520 to 550 B.Th.U. All public authorities were now working under lower standards; and the poorer quality of gas applied not only to Padiham but to other towns. The quality of gas in Padiham was, in fact, above the average. With incandescent appliances kept in good order, it was claimed that as good a light as ever could be obtained.

Maximum Price Reached at Teignmouth.—It was reported at a meeting of the Teignmouth Urban District Council last Tuesday that the gas-works were being run at a considerable loss, and that with gas at 6s. 9d. per 1000 c.ft. there would still be a deficit. It was agreed that the price be increased to the maximum allowed by their Order, and that the charges for the hire of slot-meters and cooking-stoves be increased *pro rata*. Mr. Harold Higham (the Gas Manager) said the loss for the quarter ending Sept. 30 was about £500. In future the position would be even worse, as the Government had ordered that the Yorkshire coal supplies, which came by rail, must be replaced by seaborne coal from Durham. This would cause the average price of coal to be increased by about 15s. per ton over that ruling before July 31.

Gas Supply of Adelaide.—Presenting the accounts for the year ended June 30, the Directors of the South Australian Gas Company (Adelaide) reported that, despite the difficulties still arising out of the war, and from Coal Board restrictions on the use of gas, the increase in gas sales for the year was 7 p.ct., and in the number of consumers 1300. Since 1913, though the increase in the population had been only 15 p.ct., the consumers had increased by 45 p.ct. Lack of shipping, and more recently the seamen's strike, had resulted in the coal stocks becoming almost exhausted. Financial provision for re-stocking had, however, been made. As a consequence of the employees approaching the Federal Arbitration Court, the minimum wage was increased from 10s. 3d. to 10s. 8d. per day, with a similar advance to all other grades provided for.

Kendal Gas Manager's Salary.—The Kendal Corporation Gas Committee considered a letter from the Gas Manager (Mr. W. R. Wilson) stating that he had been offered the appointment of Gas Manager at Workington, at a salary commencing at £400 per annum, but that he was prepared to reject the offer if the Committee would increase his salary so as to approach more nearly the offer of the Workington Corporation. The following proposals were placed before him: That his salary be increased from £325 to £345 per annum as from Sept. 1, 1919, to Aug. 31, 1920; from £345 to £365 a year from Sept. 1, 1920, to Aug. 31, 1921; and a further £20 on Sept. 21, 1921—with house and rates free, as hitherto. In view of these advances Mr. Wilson will waive all claim to further increases unless the Treasury Award is applied to the other officials in the borough, in which case the present advances are to be considered as part of such award as from Sept. 1, 1919. Mr. Wilson accepted the offer.

Loss at Ballymena.—It was stated at a meeting of the Ballymena Urban District Council, on the authority of the Finance Committee, that there was a loss of about £6 per day on the gas undertaking; and it was decided to at once increase the price of gas from 5s. to 7s. 6d. per 1000 c.ft.

Bradford's Increased Maximum.—The Ministry of Health having intimated to the Bradford Corporation that they are prepared to sanction the increase of the statutory limit of the price of gas in accordance with the recent application for an advance from 4s. to 6s. per 1000 c.ft., the Gas Committee recommend an immediate increase of 10d. per 1000 c.ft. for all purposes.

Purchase Suggested at Altrincham.—Mr. L. Wild, in accordance with notice of motion, moved at the monthly meeting of the Altrincham Urban District Council that a letter be written to the Directors of the Altrincham Gas Company, to ascertain whether they are prepared to recommend the shareholders to sell the undertaking to the Council; and, if so, upon what terms. After some little discussion, in which it was suggested that it was too big a matter to decide then, and that it should be discussed at the December meeting of the General Purposes Committee, Mr. Wild expressed himself agreeable to the matter being deferred; and this course was adopted.

Chesterfield Gas Profits.—The audited accounts of the Chesterfield Gas Board show that the gross profit for the past year was £15,139, compared with £10,181 for the previous year. Coal cost £20,483, as against £17,587; and wages amounted to £4117, compared with £2806. The increased receipts from sales of gas were £4390, and from residuals £3398. There were 2560 ordinary consumers, and 8838 prepayment meter users. A letter has been received from the Ministry of Health asking for the views of the Gas Board upon Chesterfield's extension scheme, under which the gas undertaking will pass to the control of the Corporation. The Gas Board have approved the Corporation's scheme.

Accrington Gas Board and Vertical Retorts.—At a meeting of the Accrington and District Gas Board, consideration was given to the reconstruction of the gas manufacturing plant at Great Harwood on the vertical retort system. Mr. A. J. Harrison (the Manager) explained the scheme at length; and it was provisionally approved. The proposals will entirely dispense with the manufacture of gas at Accrington; and already a high-pressure gas-main has been laid between the two towns. The carbonizing section of the plant will be reorganized to produce 3 million c.ft. of gas per day. There will also be a reconstruction of ammonia plant, as well as a properly fitted workshop for repairs and a checking department for stores. The Accrington works will be used as a storage station; and a valuable site will be released.

Public Lighting Charges at Hull.—Acting on behalf of the British Gas Light Company, Ltd., Mr. Harold E. Copp, the Engineer and Manager at Hull, has suggested to the Corporation the following scale of adjustments in the prices to be charged for public lamps: 2500 lamps or more, £4 15s. per lamp per annum; 2000 to 2500, £5; 1500 to 2000, £5 5s.; 1000 to 1500, £5 15s.; 500 to 1000, £6 5s.; and less than 500, £6 15s., with a charge of 15s. for all unlighted lamps. The additional charge to cover the increase in cost of coal above contract price on July 1, 1919, is to be 1s. 6d. per lamp per annum for each 1s. per ton increase; and similarly to meet advances in wages, 1s. 6d. per lamp per annum for each 1s. per week advance in the wages of lamplighters and lamp repairers. Mr. Copp says that these figures are well under the cost to the Company in each case. The Works Committee of the Corporation who are considering the matter have invited Mr. Copp to meet them.

Coke-Oven Gas Proposed for Redcar.—A curious situation has arisen at Redcar. The Urban District Council provisionally decided to accept the offer of the Gas Company to sell the works for £115,000, with an additional amount as compensation to the Directors and staff; and the shareholders of the Company, at an extraordinary meeting on the 29th ult., endorsed the proposal to sell the works. But it is now stated that Messrs. Dorman, Long, & Co., ironfounders, who have made considerable works extensions in the Redcar area recently, are contemplating the installation in the near future of a new battery of coke-ovens at their Redcar works; and in view of the successful experiment in the neighbouring town of Middlesbrough, where coke-oven gas is now used almost exclusively, it is suggested that similar advantageous arrangements could be arrived at with Messrs. Dorman, Long & Co. with regard to Redcar's gas supply. Mr. Phillipson had given notice that he would move at the meeting of the Council last Thursday that the minutes accepting the offer of the Gas Company to sell their works should be rescinded. On rising to submit the motion, the Chairman ruled it out of order. Mr. Phillipson protested vigorously, and asked for the reason for the ruling, whereupon the Chairman replied that Mr. Phillipson would have his opportunity in due course at the ratepayers' meeting which must be held. Any ratepayer could object, he said, to the proposal at a statutory meeting. The Council's resolutions had been acted upon; and any other action would render the Council liable to be sued for damages for breach of contract. Mr. Phillipson again protested, and gave notice that the matter should be ventilated at a Council meeting. The Council eventually decided to have a special meeting to deal with the matter.

After a trial installation, the County Borough of Burton-on-Trent Gas Department have decided to instal in their public gas-lamps 400 of the "A. & M." patent pressure wave automatic controllers.

An agent in Montauban (Tarn-et-Garonne), established for many years and with extensive connections among farmers in the South of France, desires to obtain agencies for United Kingdom manufacturers and exporters of chemical manures, fertilizers, &c. Inquiries should be addressed to the Department of Overseas Trade (Development and Intelligence), No. 4, Queen Anne's Gate Buildings, S.W. 1—quoting "France No. 813." A firm of general import and export merchants at Hongkong wish to get into touch with United Kingdom manufacturers of sulphate of ammonia for fertilizing purposes, dyes, &c. Inquirers should quote "Hongkong, No. 744." An applicant at Liège desires to obtain agencies for the sale of gas-fittings, gas metallic tubing, &c. Quote, "Belgium, No. 753."

Manufacturers—

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DEEPFIELDS, Nr. Bilston, Staffs.

London Office and Show-Rooms:

57 TO 60, BATH HOUSE, HOLBORN VIADUCT, E.C.

Australasian Agents: MOLDEN & BUDDEN PTY., Ltd.,
364a, Little Collins Street, MELBOURNE; Vic., and at SYDNEY, N.S.W.

The Directors of the South African Lighting Association, Ltd., have resolved to pay an interim dividend of 4 p.ct. (8 p.ct. per annum), less income-tax, on Oct. 29, to shareholders registered in the books of the Association on the 23rd inst. This dividend is at a similar rate to that paid a year ago.

At an inquest at Bradford, on the body of Fred. Swaine, a labourer, who died of injuries received in falling from a scaffold while painting a regenerator at the Birkshall gas-works of the Corporation, a verdict of "Accidental death" was returned. The Coroner expressed the opinion that better appliances might be used, and asked the Factory Inspector to make a note of the matter.

So much delay has occurred in correspondence between the Doncaster Gas Committee and the Government Property Disposal Board, in settling final details for the proposed purchase of a 20,000 c.ft. gasholder lying at King's North, that it was decided by the Gas Committee, that if negotiations were not completed within a few days, the whole of the correspondence should be submitted to the local Member of Parliament, with a view to his hurrying the matter.

At the Dublin Dockyard Company's yard, North Wall, the launch took place on Friday of the seventh vessel built by the firm for the South Metropolitan Gas Company. On leaving the ways, the vessel, which has a tonnage of 2500, was named "Old Charlton."

The Distance Lighting Company have removed from No. 69, Farringdon Road, to new, more commodious, and convenient premises at No. 17, L. & S.W. Station Approach, Falcon Road, Clapham Junction, S.W. 11, where Mr. Maurice Schwab (the proprietor) will carry on the manufacture of automatic street-lamp controllers.

The Richmond Gas Stove & Meter Company, Ltd., have now removed to their new premises at Nos. 164-172, Queen Victoria Street, London, E.C. 4, to which address all communications intended for their London Offices should be sent. The showroom portion of the building is not yet quite complete; but it is hoped to have it finished in a few weeks. The firm's telegraphic address remains as at present —"Gasapparatus, Cent, London;" but their telephone number has been altered to City 7450 (three lines).

STOCK MARKET REPORT.

The termination of the railway strike brought a feeling of relief to the Stock Exchange, in common with every other market in the United Kingdom. Confidence that such a result would be attained had for some time been entertained in the House, and markets in general had shown wonderful firmness. But, nevertheless, there was room on top for more when the settlement had become a *fait accompli*. Business was active and abundant far beyond recent proportions, and flowed over into the street after closing hours. Prices on the whole advanced freely, subject to slight reaction from time to time, and some perhaps were getting a little shaky towards the close.

In the gilt-edged department, Government issues for the most part were in good demand, and on Friday Consols marked 53¼. War Loan 95. Funding 78⅛, and Victory 85¼. Home Rails had a fair advance, but became dullish later, and fell very quiet indeed. Canadians were supported; but Argentines showed some inclination to ease.

The Foreign Market was fairly firm. French Loans improved, although the Exchange did not always favour; and Russians met with some demand in view of apparent Bolshevik decay. Japanese were firm. In the Miscellaneous Market there was much excitement; the centre of activity being Oil, in which the speculation exceeded healthy proportions. Rubber was quiet and steady. Among the rest of the Miscellaneous Group, Textiles, Iron and Steels, and Breweries were in good favour.

Business in the Gas Market showed some accession of activity beyond the measure of the week before, unevenly distributed—being mostly in Imperial Continental. This rose steadily from 124⅜ to 128, closing firm at a gain of 1 in the quotation. The London Companies were mostly unchanged. South Metropolitan debenture was 1⅛ lower. Malta and Mediterranean shares changed hands at 40s.; and they were marked-down accordingly.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 56, Gas Light ordinary 59, 59¼, 59⅜, Imperial Continental 124⅜, 125¼, 126, 127, Monte Video 12⅜, 13, South Metropolitan 58, South Suburban 69⅛. On Tuesday, Brentford "B" 54, European 12¼, 12⅛, Gas Light ordinary 59¼, ditto maximum 47⅛, ditto preference 66, Imperial Continental 124⅜, 125⅜, 126, Primitiva 32s. 6d., ditto preference 66s. 3d., 68s. 9d., San Paulo 7⅜, ditto debenture 40, South Metropolitan debenture 52, South Suburban 70⅛, Tottenham "B" 52½. On Wednesday, Brentford "A" 55, European 12 1/16, Gas Light ordinary 59, 59¼, 59⅜, ditto preference 66⅛, Imperial Continental 124⅛, 125⅛, 126, Malta and Mediterranean 40s., Newcastle 63, 64⅛, South African, 12⅜, San Paulo debenture 40. On Thursday, Commercial 4 p.ct. 55½. Gas Light ordinary 59⅛, Imperial Continental 124⅛, 125, 125⅛, 126, Primitiva preference 65s., South Metropolitan 58, 59. On Friday, Alliance and Dublin 46⅛, 47, 47⅛, 48⅛, Bombay 5 1/16, Commercial 4 p.ct. 54, 55, European 12⅛, Gas Light ordinary 59, 59⅛, 59⅜, 60, Imperial Continental 125¼, 126⅛, 126½, 127, 128, Primitiva 31s. 3d., ditto preference 65s., South Metropolitan 60, Tottenham "B" 53, Barnet 4 p.ct. debenture 66.

In the Money Market, the position continued to be one of abundant supply, and rates consequently were extremely easy. Discount was unsettled and variable. The price of silver fell to 62⅛d. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares	When Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	80—85	..
1,551,868	,,	Sept. 26	4½	2¼%	Alliance & Dublin Ord.	39—34	43—48*	46⅛—48½
874,000	,,	July 11	4	4%	Do. 4 p.c. Deb.	75—79	80—83	..
280,000	5	April 29	7½	5%	Bombay, Ltd.	5⅞—6	5⅛—5⅜	5 1/16
80,000	10	Aug. 28	15	12½	Bournemouth Gas & Water { 10 p.c. B ¶ p.c. Pref. 6 p.c. 4 p.c. Deb.	25—30	15—20	..
868,110	10	,,	7	7%		15—15½	10—11	..
115,000	10	,,	6	5/-		13½—14	9½—9⅝	..
159,740	—	June 27	—	4%		..	85—87	..
992,045	Stk.	July 11	14	37/-	Brentford A Consolid.	261—266	55—60	55—56
784,220	,,	,,	11	31/8	Do. B New	204—209	50—55	54
55,000	,,	,,	6	5%	Do. 5 p.c. Pref.	109—111	76—78	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	84—86	..
214,775	,,	Sept. 11	11	7½%	Brighton & Hove Orig.	203—213	123—128	..
244,200	,,	—	8	5½%	Do. A Ord. Stk.	154—159	84—89	..
933,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	10	Sept. 26	13½	10%	British	44—45	25—27*	..
180,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88—90	63—65	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	59—63	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	6½—7	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	61—66	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,513,280	,,	Aug 14	5/9/4	30/-	Commercial 4 p.c. Stk.	103—108	55—60	54—55½
680,000	,,	,,	5½	26/8	Do. 5½ p.c. do.	103—105	54—57	..
475,600	,,	June 11	8	8%	Do. 8 p.c. Deb. Stk.	69½—71½	50—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	43—48	..
200,000	,,	,,	7	—	Do. ¶ p.c. Pref.	115—118	65—70	..
51,600	Stk.	Aug. 28	14½	12%	Croydon A 10 p.c.	..	150—160	..
778,400	—	,,	11½	9%	Croydon B and C ¶ p.c.	..	105—115	..
493,276	Stk.	—	8	6½%	Derby Con. Stk.	128—125	..	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,002,180	10	July 30	10	6/6	European, Ltd.	17½—18	12—13	12 1/16—13⅛
16,298,975	Stk.	,,	4/17/4	30/-	Gas Light and Coke { 4 p.c. Ord. 5½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98—102	58—61	59—60
2,600,000	,,	,,	5½	26/8		76—79	47—49	47½
4,062,235	,,	,,	4	4%		96—99	65—68	66—66½
4,674,850	,,	June 11	8	8%		72½—74½	52—55	..
180,000	,,	,,	10	10%		..	..	..
82,500	,,	Sept. 11	5	4⅜%	Hastings & St. L. 5 p.c.	..	57—62	..
268,740	,,	,,	5½	2¾%	Do. 5½ p.c	37—39	42—47	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	15½—16½	12—13	..
66,600	Stk.	Aug. 28	9	8½%	Hornsey ¶ p.c.	..	110—115	..
181,000	,,	Sept. 11	7½	6⅜%	Ilford A and C.	151—154	88—98	..
65,780	,,	,,	6⅔	4⅔%	Do. B	115—118	67—72	..
65,500	,,	June 27	4	4%	Do. 4 p.c. Deb.	92—94	61—64	..
4,949,000	,,	May 14	9	4½%	Imperial Continental	150—160	125—130	124⅜—128
1,325,000	,,	Aug. 14	8½	8½%	Do. 8½ p.c. Deb. Red.	84—86	79—81	..
235,942	,,	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	87—92	..
2,498,908	,,	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A B	211—218 146—148	..	..
806,068	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	,,	Aug. 14	7/5/6	37½	Maidstone 5 p.c.	..	55—61	..
75,000	5	June 11	5	5%	Malta & Mediterranean	4½—4¾	2—3	2
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97*	..
541,980	20	May 29	4	5%	Monte Video, Ltd.	11½—12	12½—13	12⅜—13
1,575,892	Stk.	July 30	4½	3½%	Newcastle&Gateh'd Con.	98½—99½	64—65	63—64½
539,786	,,	June 27	5½	5½%	Do. 5½ p.c. Deb.	82—83	57—58	..
15,000	10	Sept. 11	—	11⅝%	North Middlesex 10 p.c.	..	12½—13½	..
56,940	,,	,,	7/14/0	7½%	,, ,, 7 p.c.	14—15	9—9½	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	4½—5½	..
60,000	50	Aug. 28	13	7½%	Portsea, Island B	125—131	14—16	..
120,000	50	,,	13	6½%	Do. C	118—121	66—68	..
349,980	5	April 29	6	—	Primitiva Ord.	5½—6	1½—2	31/3—32/6
499,980	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	3½—3¾	65/—68/9
831,800	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	71—73	..
600,000	Stk.	July 30	4	4%	Do. ,, 1911	..	49—52	..
946,198	,,	June 27	4	4%	River Plate 4 p.c. Deb.	86—87	49—52	..
150,000	10	Sept. 26	6	5%	San Paulo { 5 p.c. Pref. 5 p.c. Deb.	10½—11	7⅜—8*	7⅝
125,000	50	July 2	5	5%		4¾—49	40—42	40
155,000	Stk.	Aug. 28	10	5%	Sheffield A	225—234	81—85	..
309,984	,,	,,	10	5%	Do. B	223—234	81—85	..
238,500	,,	,,	10	4⅝%	Do. C	220—222	70—72	..
129,901	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
99,000	10	June 27	5	10%	South African	10½—11⅛	12½—13½	12⅜
6,669,295	Stk.	Aug. 14	5/4/0	30/-	South Met. 4 p.c. Ord.	11⅞—11⅝	58—61	58—60
350,000	,,	July 11	—	5%	Do. Pref.	..	94—96	..
1,695,445	,,	,,	—	5%	Do. 3 p.c. Deb.	72½—74½	50—53	53
234,980	,,	Aug. 14	5½	5%	South Shields Con. Stk.	15¶—159	104—106	..
969,795	,,	,,	6	5⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	68—73	69½—70½
197,568	Stk.	June 27	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—91	..
647,740	,,	May 14	7½	5%	Southampton Ord.	99—102	68—69	..
131,375	,,	June 27	4	4%	Do. 4 p.c. Deb. Stk.	..	63—65	..
190,000	,,	Aug. 14	—	4½%	Tottenham { A 5 p.c. B 5½ p.c. 4 p.c. Deb.	136—139	70—75	..
769,275	,,	,,	6	5%		115—117	50—55	52½—53
181,255	,,	June 26	4	4%		87—89	64—66	..
129,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
236,476	Stk.	Sept. 26	5	5%	Tynemouth 5 p.c. max.	108½—109	80½—82½*	..
80,000	,,	Aug. 28	8½	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	85 90	..
255,686	,,	,,	6½	40/-	Do. B 5½ p.c.	129—134	68—68	..
108,075	,,	,,	—	38/6	Do. C	..	68—68	..
140,865	,,	,,	—	38/6	New Ordinary	..	68—68	..
853,000	,,	,,	5½	33/9	Wimbledon 5 p.c.	117—122	65—70	..
98,000	,,	,,	6⅔	40/-	Epsom 5 p.c.	121—126	65—70	..
82,416	,,	June 27	8	8%	3 p.c. Deb. Stk.	66—69	49—51	..

* Ex Div.

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